

SPECIFICATIONS
FOR
ALTERNATE SITE IMPOUNDMENT AREA
EARTH DAM AND APPURTENANT CONSTRUCTION
PLATEAU RESOURCES LIMITED
772 HORIZON DRIVE, GRAND JUNCTION, COLORADO

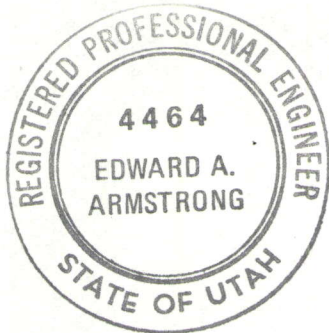
INSTRUCTION TO CONTRACTORS
GENERAL CONDITIONS
GENERAL SPECIFICATIONS
SPECIAL PROVISIONS

ARMSTRONG ENGINEERS AND ASSOCIATES, INC.
ENGINEERING CONSULTANTS
861 ROOD AVENUE
GRAND JUNCTION, COLORADO

AUGUST, 1980

CERTIFICATION

I hereby certify that these specifications for the construction of the Alternate Site Impoundment Area Dam were prepared under my direct supervision for the owners thereof.



Raymond Hansen
Raymond Hansen, P.E.

Edward A. Armstrong
Approved by:
Edward A. Armstrong, P.E.

I, R. L. HEIKS, Vice President for Plateau Resources Limited of Grand Junction, Colorado, whose post office address is Grand Junction, Colorado, do hereby accept and approve these specifications for the construction of the Alternate Site Impoundment Area Dam.

R. L. Heiks

APPROVED on the _____ day of _____, 19____.

State Engineer

By: _____
Deputy

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ALTERNATE SITE IMPOUNDMENT AREA
EARTH DAM AND APPURTENANT CONSTRUCTION
PLATEAU RESOURCES LIMITED OF GRAND JUNCTION, COLORADO

INSTRUCTIONS TO CONTRACTORS

1. Scope of Work

The project is located in Section 17, Township 35 South, Range 11 East of the Salt Lake Base & Meridian, Garfield County, Utah, and consists of construction of an earth embankment and all other appurtenant items.

- A. The Contractor shall furnish all material, equipment, tools, and labor necessary to do the work required under this contract, clean the work site and restore all areas affected or damaged in the course of the work, all as shown on the Plans or called for in the Specifications.

2. Contractor's Qualifications

Contractor shall be prepared to satisfy Owner as to their integrity, experience, equipment, personnel and financial ability to perform work specified.

3. Proposals

It is the intent of the Owner to have this work performed under a time and material type contract. The scope and contents of that contract are not a part of these Specifications. Should any conflict arise between these Specifications and the Owner's Contract, the Engineer is to be notified for an interpretation of the Specifications. However, any reference to payment in the General or Special Provisions should be neglected.

4. Contract

The Contractor shall:

- a. Be required to execute the necessary bond with surety acceptable to the Owner.
- b. The Contractor must carry insurance acceptable to the Owner covering public liability, property damage and workmen's compensation.

The aforesaid bonds shall be subject to approval by the Owner.

5. Time of Construction

The time for completion of the work contemplated will be as specified in accordance with the Contract with the Owner.

6. Commencement of Work

Work will not be started until all applicable State and Local permits have been obtained.

7. State and Federal Regulations

The Contractor must fully comply with all applicable Federal and State requirements pertaining to the work, employees used on the job and any special requirements pertaining to work procedures.

8. Any questions concerning interpretation of intent of the Plans and Specifications should be directed to:

ARMSTRONG ENGINEERS AND ASSOCIATES, INC.
861 Rood Avenue
Grand Junction, Colorado 81501
(303) 245-3861

9. Quantities

The approximate quantities for the various items to be performed, which is only meant to provide a general scope of work, are as follows:

<u>Item No.</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity</u>
1	Care of water and unwatering foundations	L U M P	S U M
2	Excavation, unclassified, stripping foundations, Foundation	cu. yd.	9,000
3	Excavation, unclassified, stripping foundations, Borrow	cu. yd.	4,000
4	Excavation, unclassified, for Alternate Site Impoundment Area Dam	cu. yd.	41,000
5	Excavation, unclassified, in Borrow and transportation to Alternate Site Impoundment Area Dam	cu. yd.	145,000
6	Excavation, unclassified, for abutment cutoffs	cu. yd.	36,000
7	Placing upstream blanket in Alternate Site Impoundment Area Dam	cu. yd.	9,270

<u>Item No.</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity</u>
8	Placing filter blanket in Alternate Site Impoundment Area Dam	cu. yd.	1,525
9	Base course under riprap (6")	cu. yd.	1,460
10	Riprap, Type A	cu. yd.	4,375
11	Compacted backfill (Dam)	cu. yd.	166,000 cu. yds.
12	Piezometer	Ea.	4
13	Movement Monument	Ea.	3
14	Drain Pipe 6 Inch Diameter	lin. ft.	425
15	Pressure Relief Well	Ea.	3

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GENERAL INFORMATION

This engineering study was undertaken as a result of an agreement between PLATEAU RESOURCES LIMITED and ARMSTRONG ENGINEERS AND ASSOCIATES, INC. of Grand Junction, Colorado.

Subsequently, a site investigation, both surface and subsurface, was undertaken to locate a suitable site for an alternate site mine waste water impoundment area, with future potential for expansion and enlargement, and to analyze and design an economical enclosure structure using present available material to the maximum extent.

At present the mine waste water is discharged at a temporary impoundment area located where shown. Due to the limited storage capacity of the existing and temporary site a proposed 17.5 acre Alternate Site Impoundment Area was located. This report summarizes the findings and features an earthfill closure structure designed to prevent most, if not all, of the seepage and underseepage and to resist rotational and seismic forces with a minimum factor of safety of 1.5.

The proposed Alternate Site Impoundment Area Dam location is in Section 17, Township 35 South, Range 11 East of the Salt Lake Base Meridian, in Garfield County, Utah. The drainage area for the Alternate Site Impoundment Area Dam consists of approximately 50 acres of foothill and cliff areas.

The subject study is located in an area where the 26 year storm is rated at 2.47 inches in a 24 hour period.

The Alternate Site Impoundment Area Dam is not located upon a stream but forms a natural basin for the waste water impoundment and evaporation area. Charging of the storage basin will be primarily from the discharge of the mining operation. Due to the limited size of the contributing runoff area and the difficulty and expense in providing adequate runoff diversion ditches, such has not been addressed.

Surface soils within the construction area of the proposed Alternate Site Impoundment Storage Area and Dam is weathered and decomposed sedimentary rocks of the Jurassic and Cretaceous age. The proposed impoundment area is located on the Morrison Formation and consists of alternating layers of shale or claystone and sandstone. Variegated shales are interbedded with minor lenses of grayish white to buff, fine to coarse grained and sometimes cross-bedded sandstone. The sandstone is calcaeous, conglomeratic, concretionary and limonitic. It is in places very hard and dense and in other places extremely friable. The predominant shales and claystones are gray at the surface and become banded with red, green and purple. Most of the clays are weathered montmorillonite. It can be deducted that the white to gray swelling clays are bentonite derived from weathering of volcanic ash. The expansive properties of the bentonite clays can help in sealing voids but may also feature deep desiccation fractures when dry.

The weathered zone is approximately 20 inches deep at the surface. Higher laying Dakota Formations forms the rim of the basin together with Mancos Shale. The Dakota Formation consists of silty banded chert, rich limestone and conglomeratic sandstones. The lower unit is gray silty limestone rich with bedded brown chert and capped by conglomeratic sandstone. The Dakota Formation is about 40 feet in thickness.

The shallow Mancos Shale lays above the Dakota Formation and consists of medium to dark gray, bentonitic shale.

Throughout the impoundment area intermittent and discontinuous patches of Quaternary gravels can be found.

The proposed impoundment area consists principally of sedimentary beds dipping 3° westerly. The bentonitic shale and claystone slopes are covered with thin colluvium that show evidence of small mudflows. None of these flows should pose any hazard to the project. The bentonitic clays, however, can develop very deep desiccation fractures and could produce piping. Only a few small samples were found on the proposed site. Piping should, however, be closely monitored throughout the construction and especially in the proposed cutoff trench, on upstream blankets and in abutment areas. Using care throughout the construction should alleviate most, if not all, of the major problems.

The soils and geological data are on file and can be inspected at the office of Armstrong Engineers and Associates, Inc., 861 Rood Avenue, Grand Junction, Colorado 81501.

GENERAL CONDITIONS

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1 INTENT OF CONTRACT DOCUMENTS

- (a) The intention of the documents is to set forth requirements of performance, type of equipment and structures, and standards of materials and construction. It is also intended to include all labor and materials, equipment and transportation necessary for the proper execution of the work, to require new material and equipment unless otherwise indicated, and to require complete performance of the work in spite of omission of specific reference to any minor component part. It is not intended, however, that materials or work not covered by or properly inferable from any heading, branch, class or trade of the specifications shall be supplied unless distinctly so noted. Materials or work described in words, which so applied have a well-known technical or trade meaning, shall be held to refer to such recognized standards.

2 CONTRACTOR'S RESPONSIBILITY

- (a) The Contractor assumes full responsibility for the safe-keeping of all materials and equipment and for all unfinished work until final acceptance by the Owner, and if any of it be damaged or be destroyed from any cause, he shall replace it at his own expense.
- (b) The Contractor shall indemnify and save harmless the Owner against any liens filed for nonpayment of his bills in connection with the Contract work. The Contractor shall furnish the Owner satisfactory evidence that all persons who have done work or furnished materials, equipment, or service of any type under this Contract have been fully paid prior to the acceptance of the work by the Owner.

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- (c) The Contractor shall erect and maintain such barriers and lights and/or watchmen as will protect and warn pedestrians and vehicles, and prevent accidents as a consequence of his work. He shall indemnify and hold harmless the Owner, the Owner's employees, the Engineer, and the Engineer's employees from any and all liability, loss, cost, damage, and expense (including reasonable attorney's fees and court costs) resulting from, arising out of, or incurred by reason of any claims, actions, or suits based upon or alleging bodily injury, including death, or property damage arising out of or resulting from the Contractor's operations under this Contract, whether such operations be by himself or by any subcontractor or by anyone directly or indirectly employed by either of them. The Contractor shall obtain insurance for this purpose, which shall insure the interests of the Owner and Engineer as the same may appear, and shall file with the Owner and Engineer certificates of such insurance.
- (d) The Contractor shall protect the Owner's property and adjacent property from injury or loss resulting from his operations. Objects sustaining such damage shall be replaced to the satisfaction of the Owner and Engineer; the cost of such repairs shall be borne by the Contractor.

3 SUBCONTRACTS

- (a) The Contractor shall not assign, sublet, or transfer the whole or any part of the work herein specified without the written consent of the Owner. Any such assignment, subletting, or transfer shall not in any manner relieve the Contractor from any of the responsibilities assumed herein.
- (b) For convenience of reference and to facilitate the letting of contracts and subcontracts, the detailed specifications are separated into titled parts. Such separation shall not, however, operate to make the Engineer an arbiter to establish limits to contracts between Contractor and subcontractors.

4 CONTRACTOR'S EMPLOYEES

- (a) The Contractor shall either personally superintend his work or shall cause it to be done by a capable superintendent satisfactory to the Engineer, and such superintendent shall be authorized to act in behalf of the Contractor and to supervise the work in a manner that will comply with all requirements of the plans and specifications as interpreted by the Engineer.
- (b) Incompetent or incorrigible employees shall be dismissed by the Contractor or his representative when requested by the Engineer, and such persons shall not again be permitted to return to work without the written consent of the Engineer.

GENERAL CONDITIONS

- (c) No person whose age or physical condition is such as to make his employment dangerous to his health or safety, or to the health or safety of others, shall be employed in the development of the project.
- (d) There shall be no discrimination against any employee or applicant for employment because of race, creed, or color. This provision shall be included in all subcontracts.

5 PATENTS

- (a) All fees or royalties for patented inventions, equipment, or arrangements that may be used in any manner connected with the construction or erection of the work, or any part thereof, shall be included in the price mentioned in the Contract.
- (b) The Contractor shall protect and hold harmless the Owner against any and all claims or litigation by reason of infringement of any patent rights on any materials, equipment, or construction furnished by the Contractor.

6 GUARANTEE

- (a) The Contractor shall guarantee all work and material against all defects for the period specified in the Form of Bond. The Contractor shall repair or replace any such defects in a manner acceptable to the Owner, and without expense to the owner, within 10 days after notification in writing by the Owner of such defect. If the Contractor shall not have made said repairs or replacements or have made arrangements for the correction thereof within the period specified above, the Owner shall do so and shall charge the cost of same to the Contractor.

7 SURETY BOND

- (a) Prior to the signing of the Contract, the Contractor shall furnish a good and sufficient surety bond on the form provided in the full amount of the Contract.
- (b) Bond shall guarantee faithful performance of all the provisions of the Contract, including the guarantee of all work and material against all defects for the period specified in the Form of Bond, and the payment of all bills and obligations arising from said Contract.
- (c) Should the surety become irresponsible during the time the Contract is in force, the Owner may require additional and sufficient sureties and the Contractor shall furnish same to the satisfaction of the Owner within ten days after written notice to do so. In default thereof, the Contract may be suspended as hereinafter provided.

8 INTERPRETATION OF PLANS AND SPECIFICATIONS

- (a) The Contractor shall promptly report any errors or ambiguities in the plans and specifications to the Engineer. Questions as to meaning of plans and specifications shall be interpreted by the Engineer, whose decision shall be final and binding on all parties concerned.
- (b) The Engineer will provide the Contractor with such information as may be required to show revised or additional details of construction.
- (c) The Contractor will not be allowed to take advantage of any errors or omissions in the plans and specifications. The Engineer will provide full information when errors or omissions are discovered.

9 DECISIONS BY ENGINEER

- (a) The Engineer shall, within a reasonable time after presentation, make decisions in writing on claims between the Contractor and Owner. Such decisions shall be regarded as final, except that recourse to arbitration may be had as hereinafter provided.

10 WORKMANSHIP AND MATERIALS

- (a) All work done and all materials and equipment furnished by the Contractor shall conform to the plans and specifications. Competent labor and tradesmen shall be used on all work.
- (b) All workmanship shall be of the best quality.
- (c) Wherever the specifications call for an item of material or equipment by a manufacturer's name and type, and additional features of the item are specifically required by the specifications, the additional features specified shall be provided whether or not they are normally included in the standard manufacturer's item listed.
- (d) Wherever the specifications call for an item of material or equipment by a manufacturer's name and type, and the specified item becomes obsolete and is no longer available, the Contractor shall provide an item equal in quality and performance which is currently available, at no change in Contract price.

11 INSPECTION

- (a) The Engineer shall observe the work on behalf of the Owner, and will provide general assistance during construction insofar as proper interpretation of the Contract requirements is affected.

GENERAL CONDITIONS

- (b) The Engineer shall not be responsible for the acts or omissions of the Contractor's superintendent or other employees.
- (c) All materials used and all completed work by the Contractor shall be subject at all times to the observation, test, and approval of the Engineer. The Contractor shall furnish such samples of materials for examination and tests as may be requested by the Engineer and shall furnish any information required concerning the nature or source of any materials or equipment which he proposes to use.
- (d) The construction, fabrication, and manufacture of any equipment or materials specified herein may be inspected by the Engineer at the plant or factory and the Engineer shall have free access to make such inspection.
- (e) Any material, equipment, or work which do not satisfactorily meet the specifications may be condemned by the Engineer by giving a written notice to the Contractor. All condemned materials, equipment, or work shall be promptly taken out and replaced.
- (f) Any defective material, equipment, or work may be rejected by the Engineer at any time prior to final acceptance by the Owner even though said defective items may have been previously overlooked.

12 INSPECTORS

- (a) Inspectors may be appointed by the Engineer or Owner to see that the work is performed in accordance with the plans and specifications.
- (b) Inspectors shall have authority to suspend work which is not being properly performed and, subject to the final decision of the Engineer, to condemn and reject defective work and materials.
- (c) Inspectors shall have no authority to permit deviation from the plans and specifications and the Contractor shall be liable for any deviations made without a written order from the Engineer.

13 DELAYS

- (a) Delays caused by injunction or legal actions, "Acts of God", or other causes beyond the control of the Contractor (of which the Owner shall be the sole judge) shall entitle the Contractor to a reasonable extension of time within which to complete the work.

GENERAL CONDITIONS

- (b) "Acts of God" shall mean an earthquake, flood, cyclone, or other cataclysmic phenomena of nature. Rain, wind, flood, or other natural phenomena of normal intensity for the locality of the Project shall not be construed as an "Act of God" and no extension of time shall be allowed the Contractor because of effects of such phenomena.
- (c) Application for such extension of time shall be made to the Owner by the Contractor within ten days after the occurrence of such delay and shall state reasons for the request for the extension of time.
- (d) No extension of time shall be valid unless it is given in writing by the Owner.

14 CHANGES

- (a) The Engineer shall have the right, with the approval of the Owner, to order extra work or to make changes by altering, adding to, or deducting from, the work.
- (b) No such changes or extra work shall be authorized unless covered by written order of the Engineer and approved by the Owner. No changes shall be made or extra work ordered under this paragraph which will increase or decrease the total cost of the original contract price by more than 20%.
- (c) Written orders for changes or extra work shall specify an extension of the completion time, if any, and method of payment which shall be determined as follows:
 - 1) Where unit prices or unit adjustment prices form a part of the Contract, these unit prices shall be used to compute adjustment of compensation, if applicable to the changes.
 - 2) Where no applicable unit prices or unit adjustment prices form a part of the Contract, payment for the changes shall be made by one of the following methods:
 - a) By a lump sum based on Contractor's estimate, approved by the Engineer and accepted by the Owner.
 - b) By actual direct cost plus 15% for overhead and profit.
- (d) In case the Contractor deems that extra compensation is due him for labor or materials not clearly covered in the Contract, and not ordered by the Engineer as a change or as extra work, the Contractor shall notify the Engineer in writing of his intention to make claim for such extra compensation before he begins the work on which he bases his claim, and he shall furnish a daily record of the cost of the work on to the Engineer. Failure on

the part of the Contractor to give such notification or to furnish records of cost shall constitute a waiver of the claim for extra compensation. However, the filing of notice and the furnishing of cost records shall not be construed to prove the validity of the claim.

- (e) In no case shall the Contractor delay work because of lack of agreement for compensation for changes or extra work mentioned hereinbefore.
- (f) All claims for extra compensation shall be filed, in writing, with the Engineer before Owner's final acceptance of work.
- (g) When changes or extra work are done on a cost-plus basis, the Contractor shall submit a statement of costs to the Engineer for his approval. After such a statement is approved, the Engineer shall certify its correctness to the Owner.

15 UNAUTHORIZED WORK

- (a) Work done without lines and grades having been established, work done without proper inspection, or any changes made or extra work done without written authority will be done at the Contractor's risk and will be considered unauthorized, and, at the option of the Engineer, may not be measured and paid for.

16 OTHER CONTRACTS

- (a) The Owner reserves the right to let other contracts in connection with this work. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and for the execution of their work, and shall properly connect and coordinate his work with theirs.
- (b) If any part of the Contractor's work depends for proper execution or results upon the work of any other contractors, the Contractor shall inspect and promptly report to the Engineer any defects in such work that render it unsuitable for such proper execution and results. His failure to so inspect and report shall constitute an acceptance of the other contractor's work as fit and proper for the reception of his work, except as to defects which may develop in the other contractor's work, after the execution of his work.
- (c) To insure the proper execution of his subsequent work, the Contractor shall measure work already in place and shall at once report to the Engineer any discrepancy between the executed work and the plans and specifications.

17 OWNER'S RIGHT TO DO WORK

- (a) If the Contractor should neglect to prosecute the work properly or fail to perform any provision of this Contract, the Owner after ten days written notice to the Contractor may, without prejudice to any other remedy he may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor' provided, however, that the Engineer shall approve both such action and the amount charged to the Contractor.

18 OWNER'S RIGHT TO TERMINATE CONTRACT

- (a) If the Contractor should be adjudged a bankrupt, or if he should make a general assignment for the benefit of his creditors; or if a receiver should be appointed on account of his insolvency; or if he should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials; or if he should fail to make prompt payment to the subcontractors or for materials or labor; or persistently disregard laws, ordinances, or the instructions of the Engineer; or otherwise be guilty of a substantial violation of any provision of the Contract, then the Owner, upon the certificate of the Engineer that sufficient cause exists to justify such action, may, without prejudice to any other right or remedy and after giving the Contractor seven days written notice, terminate the employment of the Contractor and take possession of the premises and of all materials, tools, and appliances thereon and finish the work by whatever method he may deem expedient. In such case, the Contractor shall not be entitled to receive any further payment until the work is finished.
- (b) If the unpaid balance of the Contract price shall exceed the expense of finishing the work, including compensation for additional materials, administrative services, and engineering fees, such excess shall be paid to the Contractor. If such expense shall exceed such unpaid balance, the Contractor shall pay the difference to the Owner. The expense incurred by the Owner as herein provided, and the damage incurred through the Contractor's default, shall be certified by the Engineer.

19 CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE CONTRACT

- (a) If the Engineer should fail to issue any certificate for payment within seven days after it is due, or if the Owner should fail to pay the Contractor within thirty days of its maturity and presentation, any sum certified by the Engineer or awarded by arbitrators, then the

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Contractor may, upon seven days written notice to the Owner and the Engineer, stop work or terminate this Contract and recover from the Owner payment for all work executed and any loss sustained upon any plant or materials and reasonable profit and damages.

20 PAYMENTS WITHHELD

- (a) The Engineer may withhold or, on account of subsequently discovered evidence, nullify the whole or a part of any certificate to such extent as may be necessary to protect the Owner from loss on account of:
- 1) Defective work not remedied.
 - 2) Claims filed or reasonable evidence indicating probable filing of claims.
 - 3) Failure of the Contractor to make payments properly to subcontractors or for material or labor.
 - 4) A reasonable doubt that the Contract can be completed for the balance then unpaid.
 - 5) Damage to another contractor.
- (b) When the above grounds are removed, payment shall be made for amounts withheld because of them.

21 ACCEPTANCE AND FINAL PAYMENT

- (a) As soon as the work has been substantially and satisfactorily completed, the Engineer will certify the Contractor's final estimate stating that the work has been completed in accordance with the terms and conditions of this Contract thereof with qualifications, if any, as stated. The balance found to be due the Contractor according to the terms of payment shall be paid by the Owner upon acceptance as provided in the Contract; provided, however, that any state laws which designate the manner of final payment shall be followed in lieu of the manner of final payment outlined above. Prior to receipt of final payment, the Contractor shall file with the Owner, a receipt in full from each manufacturer, subcontractor, and dealer for all equipment and materials used on the work and a complete release of all liens, including tax liens, which may have arisen from this Contract. In lieu thereof, the Owner, at his option, may accept from the Contractor a statement showing balance due on all accounts.

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- (b) The making and acceptance of the final payment shall constitute a waiver of all claims by the Owner, other than those arising from unsettled liens, from faulty work or materials appearing after final payment or from requirements of the specifications, and of all claims by the Contractor, except those previously made and still unsettled.
- (c) If the work has been partially but substantially completed to the extent that all adjustments in the Contract sum may be made in accordance with the prices accepted in the Contractor's proposal or in accordance with the provisions of the paragraph titled "Changes" in this document, then the Engineer may, if material delay in completion is anticipated or if otherwise deemed in the interest of the work, file a final estimate, retaining, in addition to any other requirements which may be specified, an amount representing the cost of unfinished work. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

22 NO WAIVER OF LEGAL RIGHTS

- (a) Neither the payment for, nor acceptance of the whole or any part of the work by the Owner or representatives of the Owner, nor any extension of time, nor the withholding of payments, nor any possession taken by the Owner, nor the termination of employment of the Contractor shall operate as a waiver of any portion of the contract or any power therein reserved or any right therein reserved or any right therein provided.

23 OWNER'S RIGHT TO SUSPEND WORK

- (a) The Owner may at any time suspend the work, or any part thereof, by giving ten days notice to the Contractor in writing. The work shall be resumed by the Contractor within ten days after the date fixed in the written notice from the Owner to Contractor to do so.
- (b) But if the work, or any part thereof, shall be stopped by the notice in writing aforesaid, and if the Owner does not give notice in writing to the Contractor to resume work at a date within a year of the date fixed in the written notice to suspend, then the Contractor may abandon that portion of the work so suspended, and he will be entitled to the estimate and payments for all work done on the portions so abandoned, if any.
- (c) If suspension of all or part of the work causes additional expense not due to the fault or negligence of the Contractor, the Owner shall reimburse the Contractor

GENERAL CONDITIONS

for the additional expense incurred due to suspension of the work; provided, however, that this paragraph shall not be construed as entitling the Contractor to compensation for delays due to inclement weather, failure to furnish additional surety or sureties specified herein, for suspension made at the request of the Contractor, for such compensation, with complete substantiating records, shall be filed with the Engineer within ten days after the date of order to resume work in order to receive consideration.

24 · ARBITRATION

- (a) All questions subject to arbitration under this Contract shall be submitted to arbitration at the choice of either party to the dispute.
- (b) The Contractor shall not cause a delay of the work during any arbitration proceedings, except by agreement with the Owner.
- (c) The demand for arbitration shall be filed in writing with the Engineer, in the case of an appeal from his decision, within ten days of its receipt, and in any other case within a reasonable time after cause thereof, and in no case later than the time of final payment, except as otherwise expressly stipulated in the Contract. If the Engineer fails to make a decision within a reasonable time, an appeal to arbitration may be taken as if his decision had been rendered against the party appealing.
- (d) No one shall be nominated or act as an arbitrator who is in any way financially interested in the Contract or in the business affairs of either the Owner, Contractor, or Engineer.
- (e) Unless otherwise provided by controlling statutes, the parties may agree upon one arbitrator; otherwise there shall be three; one named in writing by each party to this Contract to the other party and to the Engineer, and the third chosen by these two arbitrators; or if they fail to select a third within fifteen days, then he shall be chosen by the presiding officer of the bar association nearest to the location of the work. Should the party demanding arbitration fail to name an arbitrator within ten days of his demand, his right to arbitration shall lapse. Should the other party fail to choose an arbitrator within the said ten days, then such presiding officer shall appoint such arbitrator. Should either party refuse or neglect to supply the arbitrators with any paper or information demanded in writing, the arbitrators are empowered by both parties to proceed ex parte.

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- (f) If there be one arbitrator, his decision shall be binding; if three, the decision of any two shall be binding. Such decision shall be a condition precedent to any right of legal action, and wherever permitted by law it may be filed in court to carry it into effect.
- (g) The arbitrators, if they deem that the case demands it, are authorized to award to the party whose contention is sustained such sums as they shall deem proper for the time, expense and trouble incident to the appeal and, if the appeal was taken without reasonable cause, damages for delay. The arbitrators shall fix their own compensation, unless otherwise provided by agreement, and shall assess the costs and charges of the arbitration upon either or both parties.
- (h) The award of the arbitrators shall be in writing and it shall not be open to objection on account of the form of the proceeding or the award, unless otherwise provided by the controlling statutes.
- (i) In the event of such statutes providing on any matter covered by this article otherwise than as hereinbefore specified, the method of procedure throughout and the legal effect of the award shall be wholly in accordance with the said statutes, it being intended hereby to lay down a principle of action to be followed, leaving its local application to be adapted to the legal requirement of the jurisdiction having authority over the arbitration.

25 OWNERSHIP OF MATERIALS

- (a) All material and work covered by partial payments shall become the sole property of the Owner, but this provision shall not be construed as relieving the Contractor from the sole responsibility for all materials and work for which payments have been made, for the restoration of damaged work, or as a waiver of rights of the Owner to require the fulfillment of all the terms of the Contract.

26 CLEANING UP

- (a) The Contractor shall at all times keep the premises free from accumulations of waste material or rubbish caused by his employees or work, and at the completion of the work he shall remove all his rubbish, tools, scaffolding and surplus materials and shall leave his work "broom clean" or its equivalent, unless more exactly specified. In case of dispute, the Owner may remove the rubbish and charge the cost to the several contracts as the Engineer shall determine to be just.

27 DEFINITION OF TERMS

- (a) "Owner," "Purchaser," "City," "Board," shall mean the party or municipality contracting to have the work done.
- (b) "Engineer" shall mean Armstrong Engineers & Associates, Inc., or the Owner's authorized representative.
- (c) "Bidder" shall mean an individual, firm, co-partnership or corporation, or combination thereof, submitting a proposal for the work contemplated and acting directly or through a duly authorized representative.
- (d) "Contractor" shall mean the individual, firm, co-partnership or corporation, and his, their or its heirs, executors, administrators, successors and assigns, or the lawful agent of any such individual, firm, partnership, covenantor or corporation, or his, their or its surety under any contract bond, constituting one of the principals to the Contract and undertaking to perform the work herein specified. Where any pronoun is used as referring to the word "Contractor," it shall mean the Contractor as defined herein.
- (e) "Subcontractor" shall mean any person, firm or corporation with a direct contract with the Contractor who acts for or in behalf of the Contractor in executing any part of the contract, but does not include one who merely furnishes material.
- (f) "Contract Work" shall mean everything implied or expressly required to be furnished and done by the Contractor by any one or more of the Contract parts referred hereof, except Extra Work as hereinafter defined; it being understood that in case of any inconsistency in or between any part or parts of this Contract, the Engineer shall determine which shall prevail.
- (g) "Contract Documents" shall mean those documents listed in the Form of Contract, including all additions, deletions and modifications incorporated therein before execution of the Contract.
- (h) "Proposal" shall mean the written offer or copy thereof of a bidder to perform the work, described by the Contract Documents when made out and submitted on the prescribed Form of Proposal, properly signed and accompanied by any required bid security.
- (i) "Contract" shall mean the written agreement covering the performance of the work described in the Contract Documents including all supplemental agreements thereto.

GENERAL CONDITIONS

- (j) "Plans" or Drawings" shall mean only those drawings specifically referred to as such in these documents, or in any Addendum. Drawings issued after the execution of the Contract to explain further, or to illustrate, or to show changes in the work, will be known as "Supplemental Drawings" and shall be binding upon the Contractor with the same force as the plans.
- (k) "Specifications" shall mean all of the directions, requirements, and standard of performance applying to the work, as hereinafter detailed and designated as such, or which may be issued in an Addendum.
- (l) "Addendum" or "Addenda" shall mean the additional contract provisions issued in writing by the Engineer prior to the receipt of bids.
- (m) "Project" or "The Work" shall mean the entire improvement of which this Contract forms a part.
- (n) "Work" shall mean equipment, supplies, materials, and services to be furnished under Contract, unless some other meaning is indicated by context.
- (o) "Written Notice" shall be considered as served when delivered in person or by registered mail to the individual, firm or corporation or to the last business address of such known to him who serves the notice. It shall be the duty of each party to advise the other parties to the Contract of any change in his business address until completion of the Contract.

28 LIABILITY AND INSURANCE

- (a) Contractor's Responsibility - The Contractor assumes full responsibility for the safekeeping of all materials and equipment, and for all unfinished work until final acceptance by the Purchaser, and if any of it be damaged or be destroyed from any cause, he shall replace it at his own expense.
- (b) Public Liability and Property Damage Insurance - The Contractor further agrees to take out and maintain during the life of this Contract; such public liability and property damage insurance as shall protect him, the Owner, and any subcontractor performing work covered by this contract, from claims for damages for personal injury, including wrongful death, as well as from claims for property damages which may arise from operations under this contract, whether such operations be by himself, the Owner, or by any subcontractor or anyone directly or indirectly employed by either. The amounts of such insurance shall be as follows:

GENERAL CONDITIONS

Public liability insurance in an amount not less than \$500,000 for injuries, including wrongful death, to any one person, and, subject to the same limit for each person on account of one accident, in a total amount not less than \$1,000,000.

Property damage insurance in an amount not less than \$500,000/\$1,000,000.

The Contractor shall furnish the Owner with certificates of insurance issued by the companies carrying the risk, covering all items of insurance required by these specifications, which said certificates shall be in form and substance satisfactory to and approved by the Owner.

- (c) No Personal Liability of Owner's Representatives - In carrying out any of the provisions of the Contract, or in exercising any power or authority granted to them thereby, there shall be no personal liability upon the Engineer or his authorized assistants or upon any of the offices, officials or representatives of the Owner, it being understood that in such matters said persons act as agents and representatives of the Owner.
- (d) Liability for Damage - The Contractor shall obey and abide by all the laws of the State of Utah relating to the employment of labor for private contract work.

29 GUARANTEE OF WORK

- (a) Guarantee - The Contractor, at the time of final acceptance, shall provide the Purchaser with a maintenance bond, acceptable to the Purchaser, running for one (1) year from the time of acceptance, which will protect the Purchaser from faulty workmanship and material.

The Contractor shall repair or replace any such defective workmanship and materials in a manner acceptable to the Purchaser, and without expense to the Purchaser, within ten (10) days after notification in writing by the Purchaser of such defects. If the Contractor shall not have made said repairs or replacements within the period specified above, the Purchaser shall do so and shall charge the cost of same to the Contractor.

30 PERMITS

The Contractor shall, at his own expense, procure all permits required of him by law for the execution of his work.

GENERAL SPECIFICATIONS

1. Specifications

Specifications are divided into two sections, General Specifications and Special Provisions.

General Specifications cover matter generally applicable to more than one or all phases of the work.

Special Provisions are subdivided into divisions, each division pertaining to a particular phase of the work. It is not the intent, nor shall it be so construed, that work included in any one division must be performed by a particular trade or by sub-contract. Likewise, the work to be performed by a particular trade is not necessarily restricted to that of any one division. Any item mentioned under any heading must be supplied even though it is not called for again under the heading for the respective work.

2. Specifications By Reference

Where reference is made in the Special Provisions to specifications or standards of any technical society, association, governmental agency, et cetra; it is understood and agreed that such specifications or standards are a part of the Special Provisions as though fully repeated therein. In interpreting any specifications or standard referred to, terms such as "Purchaser", "Owner," and the like shall be understood to mean the person, firm, or body contracting to have the work done; terms such as "Manufacturer", "Supplier", and the like shall mean the Contractor.

It is also understood and agreed that the use or application of any specification or standard referred to shall not necessarily be restricted to that which may be named in the title of the specification or standard but shall be used or applied as set forth in the Special Provisions.

A copy of each specification or standard referred to is on file in the Engineer's office. However, it is assumed that a qualified Contractor experienced in the type of work involved will have access to the specifications or standards referred to.

3. Abbreviations

The following listed letter or abbreviations shall be interpreted as indicated:

A.C.I. shall mean the American Concrete Institute.

A.S.T.M. shall mean the American Society of Testing Materials.

A.I.S.C. shall mean the American Institute of Steel Construction.

3. Abbreviations (Cont.)

A.S.A. shall mean American Standards Association.

A.S.C.E. shall mean the American Society of Civil Engineers.

A.A.S.H.T.O. shall mean the American Association of State Highway and Transportation Officials.

A.W.W.A. shall mean the American Water Works Association.

A.W.S. shall mean the American Welding Society.

Colorado Highway Specifications: shall mean the Standard Specifications for Road and Bridge Construction of the Department of Highways, Division of Highways, State of Colorado, adopted 1976, including all supplemental specifications thereto subsequently adopted.

4. Samples for Test

The Contractor shall furnish, without extra cost to the Owner, all samples of materials necessary for tests as determined by the Engineer. All samples taken for analysis and tests shall be taken in such a manner as to be truly representative of the entire lot under test and shall not be worked on in any way to alter the quality before the analysis and testing. The Contractor shall furnish such assistance and facilities as the Engineer may require for collecting, storing and forwarding the samples.

5. Source of Materials and Equipment

The Contractor shall be free to secure the approved materials and equipment from sources of his own selection. However, if the Engineer finds that the work will be delayed or adversely affected in any way because of selected source of supply cannot furnish a uniform product in sufficient quantity; or the product is not suitable for the work, the Engineer shall have the right to require that the original source of supply be changed by the Contractor. The Contractor shall have no claim for damage or additional compensation because of this requirement.

6. Water

All water used in connection with the work shall be from an approved source. The Contractor shall bear all the expense for the water used.

7. Sanitary Requirements

The Contractor shall prohibit the committing of nuisance on the site, and any employee found violating such provision shall

be promptly discharged and shall not again be employed on the work without the written consent of the Engineer.

8. Cleanliness

All rubbish, surplus excavated material and other surplus material shall be cleaned up and disposed of promptly as the work progresses, so that the area is maintained in a neat and clean condition to the satisfaction of the Engineer. Trucks hauling excavated material, cement, sand, stone or other loose materials from or to the site shall be tight so that no spillage will occur on adjacent streets. Before trucks start away from the site, their loads shall be trimmed.

9. Structures Encountered

Full responsibility shall be assumed by the Contractor for the protection of all buildings and other structures, public or private, including tracks, pavement, driveways, curbs, poles, signs, hydrants, underground pipes and conduits and other structures of every sort that may be encountered in or adjacent to the work.

Whenever settlement or lateral movement of structures might occur, adequate shoring or under pinning or other means of support shall be installed. Where necessary, such support shall be installed in advance of construction.

10. Underground Structures

Underground structures such as pipe lines, conduits and sewers are shown on the drawings. The information shown is believed to be reasonably correct and complete, although neither the correctness nor completeness of such information is guaranteed. Prior to approaching and crossing any underground utility lines, the utility company concerned shall be contacted to send a field inspector to give the exact location of their lines, pipes or conduits.

All underground structures, wherever or whatever encountered, shall be preserved or restored, and all work necessary therefor shall be included in the work under the Contract, excepting that any permanently "dead" conduit or other abandoned structures of any sort encountered in the work shall be treated as excavation and removed to the extent necessary.

11. Investigation of Existing Underground Structures

Before any excavation begins, the Contractor shall make an exploratory excavation at every point where the work to be constructed under this Contract is shown to either cross over or under an existing underground structure where the indicated clearance is two feet or less. Such existing underground

11. Cont'd.

structures shall include, but not be limited to, utility facilities, pipes, vaults, conduits, etc.

In the event that the information obtained from such exploratory excavations requires changes in the alignment, horizontally and/or vertically, that involve additional costs, the Contractor will be reimbursed therefore as provided for changes in the work in the General Conditions of the Contract.

12. Barricades, Lights and Signs

The Contractor shall, at his expense and without further or other order, provide, erect, and maintain at all times during the progress or suspension of the work, suitable barricades, fences, signs or other adequate protection, and shall provide, keep and maintain such red lights, flares, danger signals and watchmen as may be necessary or as may be ordered by the Engineer to insure the safety of the Owner, his employees, and the public as well as those engaged in connection with the work. All barricades and obstructions shall be adequately protected at night by signal lights or flares which shall be suitably placed and which shall be kept burning from sunset to sunrise. Barricades shall be of substantial construction and shall be painted to increase visibility at night. The Contractor will be held responsible for all damage to work due to failure of barricades, signs, lights and watchmen to protect it. The Contractor's responsibility for the maintenance of barricades, signs, and lights shall not cease until the project shall have been accepted.

13. Construction Stakes

Reference lines and grade points for the location, alignment and elevation of each structure will be determined and established by the Engineer, but the Contractor shall assume full responsibility for the alignment, elevations and dimensions of each and all parts of the work with reference to the lines, points, and grades as established by the Engineer, and their mutual agreement. For all structures, the Engineer shall furnish the Contractor with center lines, control lines or center points and such bench marks or other points of elevation as are necessary to lay out the work correctly. The Contractor shall check all lines, points and grades which may be given by the Engineer supplementary to the center lines, control lines, points and control bench marks aforesaid, and shall be responsible for the accuracy of all measurements for grades and alignment of the work with reference to the center lines or points and bench marks established by the Engineer.

GENERAL SPECIFICATIONS

13. Cont'd.

The Contractor shall exercise proper care in the preservation of alignment, grade and reference stakes, set for his use or that of the Engineer's. If such stakes are injured, lost or removed by the Contractor's operations, they shall be reset at his expense.

The Contractor shall, at the request of the Engineer, furnish the necessary labor to set the stakes and assist in making the necessary measurements.

14. Slope staking for embankment construction shall be the Contractor's responsibility, except that vertical control shall be checked daily by the Engineer.
15. These Plans and Specifications for Alternate Site Empoundment Area Dam may not be materially changed in any particular, except with the prior written consent of the State Engineer.
16. The works shall be subject to inspection by representatives of the State Engineer at all times, and accordingly the Contractor shall be required to provide complete cooperation during inspection visits, except that changes in design, construction, or specifications will be as directed by the Owner's Engineer.
17. The works cannot be considered complete by the Owner until approval has been obtained, in writing, by the State Engineer.
18. The Owner reserves the right to begin filling operations at Alternate Site Empoundment Area Dam prior to completion of the entire project. Filling operations will begin only after mutual agreement between the Owner, the Contractor, and the Engineer that the filling operation will have no detrimental effect on the Project.

EXCAVATION AND
EARTHWORK, GENERAL

SPECIFICATIONS
GENERAL

EXCAVATION AND EARTHWORK, GENERAL

Scope of Work. All excavation and other earthwork required to be performed under this Contract, and for all related purposes, and as may be required by the Engineer, shall be performed and executed in accordance with the herein stated stipulations and requirements. The stipulations and requirements herein set forth shall apply except when such stipulations and requirements are specifically modified in writing by the Engineer for any particular item of work.

Classification. No classification will be made of any excavated material as to its class, nature, origin or condition.

Clearing. The Contractor shall clear the areas to be occupied by the permanent construction required under these Specifications.

These areas shall be cleared of all brush, rubbish and other objectionable material, and the cleared material shall be burned or otherwise disposed of in a manner satisfactory to the Engineer. All brush and undergrowth shall be cut off at the ground surface.

All burnable material shall be piled and when in suitable condition shall be completely burned. Burning shall be done in a manner and in locations which will cause the least fire risk. All burning shall be so thorough that the materials are reduced completely to ashes. No logs, branches or charred pieces will be permitted to remain. The Contractor shall keep the clearing operations well in advance of other construction operations. Any damage to the works and public or private property caused by the Contractor's operations in clearing shall be repaired or replaced by and at the expense of the Contractor.

No quantity measurement will be made of the work performed for clearing, and the cost of clearing shall be included in the prices bid in the Schedule for the applicable items.

Blasting. Blasting for excavation will be permitted only when proper precautions are taken for the protection of all persons, The Work, and public and private properties, and only after receipt of written authorization from the Engineer. Any damage done to The Work, or property, by blasting shall be repaired by the Contractor at his expense. All necessary precautions shall be taken to preserve completed work in

a sound condition. Blasting may be done only to the depth, amount and extent, and with explosives of such strength and in such locations as will not structurally damage the material being excavated outside of the prescribed limits of the excavation.

Extreme care shall be taken in blasting operations to preserve the foundation below and beyond the grade lines indicated on the Drawing in a sound condition. No payment will be made of any material required to be excavated below or beyond the grade lines indicated on the Drawings due to the foundation being fractured or damaged in any way from over-shooting, improper blasting or carelessness on the part of the Contractor and all excess excavation resulting from the Contractor's blasting operations, as determined by the Engineer, shall be performed entirely at the expense of the Contractor. All excavated spaces, below or beyond the grade lines indicated on the Drawings, resulting from removal of material fractured or damaged in any way by the Contractor's blasting operations shall be filled completely and solidly with concrete meeting the requirements of the Specifications and no payment will be made for such concrete or the cement used in such concrete and the entire cost of refilling overexcavated spaces resulting from the Contractor's blasting operations shall be borne by the Contractor.

Excavation. Excavation shall be made to the lines and grades shown on the Drawings or established by the Engineer. During the progress of The Work, it may be found necessary or desirable by the Engineer to vary the slopes or the dimensions of the excavations from those shown on the Drawings or specified herein. The Contractor shall perform the excavation to the revised and changed slopes and dimensions, and no compensation in addition to the unit prices bid in the Schedule will be made for any increase or decrease in quantities resulting from such variations.

Excavations shall be made to the full dimensions required and shall be finished to the prescribed lines and grades, except that sharp points of undisturbed ledge rock will be permitted to extend within the prescribed lines not more than 6 inches. All necessary precautions shall be taken to preserve the material below and beyond the lines of all excavation in the soundest possible condition. Any and all excavation made for the convenience of the Contractor for any purpose or reason, except as may be ordered by the Engineer, shall be at the expense of the Contractor, and all such excess and other excavation shall be refilled, where required to complete the work, by the Contractor with materials furnished and placed at the expense of the Contractor.

All excavation for embankment and structure foundations shall be performed in the dry. No excavation shall be made in frozen materials without written approval. No additional allowance above the unit prices bid in the Schedule for excavation will be made on account of any of the materials being wet or frozen.

Excavation for structures shall be of such dimensions as to allow for the proper installation of concrete forms and to permit placing of reinforcement, concrete and other materials and for operation of

equipment and plant. Unless shown otherwise on the Drawings or directed by the Engineer, excavation lines for structures shall extend laterally one foot outside the foundation of the structure and to the original ground surface at a 1:1 slope, except where the character of the material excavated is such that it can be excavated to the required lines of the structure and the concrete can be placed against the sides of the excavation without the use of intervening forms, the excavation lines shall be the neat lines of the structure.

Structure Foundations. The bottom and side slopes of earth upon or against which concrete is to be placed shall be finished accurately to the required dimensions. Earth excavated surfaces upon or against which concrete is to be placed shall be moistened with water and tamped or rolled with suitable tools or equipment for the purpose of forming a firm foundation upon which to place the concrete structure. If, at any point in earth excavation, material is excavated beyond the established lines and grade, the overexcavation shall be filled with selected materials, and thoroughly compacted by tamping or rolling in layers not more than 6 inches thick, all entirely by and at the expense of the Contractor. Whenever the natural earth foundation material is disturbed or loosened because of the Contractor's excavation operations, it shall be consolidated by tamping or rolling, or, if required by the Engineer, it shall be removed and replaced with selected material which shall be thoroughly compacted, all entirely by and at the expense of the Contractor.

If at any point in structure excavation, material unsuitable for foundations is encountered, as determined by the Engineer, the Engineer will order removal of all such unsuitable materials and refilling with selected materials thoroughly compacted by tamping or rolling in layers not more than 6 inches thick; and payment of such excavation shall be made at the applicable unit price bid in the Schedule and payment for refilling of such excavated spaces will be made at the unit price bid in the Schedule for compacted backfill.

Slide Materials. Materials which will not stand on the slopes established by the Engineer, and materials which are a part of slides extending beyond the established lines of excavation, but which move into excavated areas, shall be removed by the Contractor in an approved manner, and the slopes shall be refinished to lines and grades established by the Engineer. The Contractor may be required to excavate potential slide areas beyond the limits of the originally staked excavation where, in the judgement of the Engineer, such excavation is necessary to prevent damage to The Work.

Payment will be made to the Contractor only for the removal of such slide materials as is directed by the Engineer, and for such slide materials as, in the opinion of the Engineer, were beyond the control of the Contractor and not preventable by the exercise of reasonable care and diligence. Payment in such cases will be made at the unit price bid in the Schedule under the applicable excavation item.

Surfaces Subject to Weathering. Certain materials encountered in the foundation for the dams, dikes and structures may be subject to weathering when exposed and will require protective measures not required by other foundation materials.

Exposure of all materials that are subject to weathering, as determined by the Engineer, between the time such material is exposed and when it is covered with embankment materials shall be held to the minimum. The final two feet of excavation performed on the dams, dikes or structure foundations, where such weathering material is encountered, shall not be performed until directed by the Engineer, which, in general, will be as near the time of embankment placement as possible. The surface of the foundation exposed by the final two feet of excavation shall be maintained dry until such surfaces are covered by embankment. If these surfaces are intermittently wetted and dried, deterioration of the surface will result and additional excavation will be required. Such additional excavation and refilling with embankment materials resulting from the Contractor's negligence in following the herein stipulated provisions as determined by the Engineer shall be performed by and at the expense of the Contractor.

The amount of excavation requiring special treatment of weathering surfaces will depend on the materials encountered during the excavation, and the cost of such special treatment, where required, shall be included in the applicable unit prices bid in the Schedule for excavation.

Excavated Materials. So far as practicable, all suitable materials from required excavations shall be used in the permanent construction required under these Specifications. The Contractor's blasting and other operations in excavations shall be such that the excavations will yield as much suitable material for construction purposes as practicable. Where practicable, suitable materials to be used for construction purposes shall be excavated separately from the materials to be wasted; shall be segregated by loads during the excavation operations; and shall be placed in the designated final locations direct from the excavation or shall be placed in temporary stockpiles and later placed in the designated locations, when so directed by the Engineer, with no additional cost to the Owner.

Excavated materials that are unsuitable, or not required in the permanent construction required under these Specifications shall be wasted. All disposal areas shall be located as directed by the Engineer and in such a manner that they will not interfere with the natural drainage, with the operation of The Work, will not detract from the appearance of the completed structures, and will not interfere with future construction work. All disposal areas shall be leveled and trimmed to reasonably regular lines and shall be sloped to drain. No waste material will be required to be hauled more than 2,000 feet to disposal areas.

All excavated materials actually placed in permanent embankment or backfill construction required under these Specifications will, in addition to the payment made for excavation, be included for payment under appropriate items of the Schedule covering such embankment or backfill construction. The cost of disposal of materials not suitable for use in permanent construction required under these Specifications shall be included in the applicable unit prices bid in the Schedule for excavation.

Backfill. The type of material used for backfill, the amount thereof, and the manner of excavating and depositing the material shall be subject to the approval of the Engineer. Insofar as practicable, all backfill material shall be obtained from material in required excavations, but when sufficient quantities of suitable material are not available from required excavations, additional material shall be obtained from approved borrow areas.

Backfill shall be built in approximately horizontal layers carried across the entire width of the backfill to the required slopes. Backfill may be built by excavating and hauling equipment, or by excavating machinery depositing the materials directly from the excavation.

The distribution and gradation of the materials throughout the backfill shall be as directed by the Engineer and shall be such that the backfill will be free from lenses, pockets, streaks, and layers of material differing substantially in texture or gradation from the surrounding material. The combined excavation and placing operations shall be such that the materials when compacted will be blended sufficiently to secure the best practicable degree of compaction and stability.

The requirements for compacted backfill are as specified herein. All materials in compacted backfill shall be placed, moistened, and compacted as provided herein.

Clayey and Silty Materials. Where compaction of earth materials containing appreciable amounts of clay or silt is required, the materials shall be deposited in horizontal layers. The thickness of each horizontal layer after compaction shall be not more than 6 inches. Where compaction is performed by hand or power tampers, the compacted layers shall not exceed 6 inches in thickness. The excavating and placing operations shall be such that the materials when compacted will secure the highest practicable unit weight and impermeability and stability. If the surface of any compacted layer of backfill is too dry or smooth to bond properly with the layer of material to be placed thereon, it shall be moistened and scarified to provide a satisfactory bonding surface before the next succeeding layer is placed. All rollers used on any one layer of backfill shall be of the same type and the same weight per foot of roller.

Prior to and during compaction operations, the materials shall have a moisture content of not greater than 2 percent wet or less than 2 percent dry of optimum moisture, as determined by the Engineer, and the moisture content shall be uniform through each layer.

Insofar as practicable, moistening of the material shall be performed at the site of excavation but such moistening shall be supplemented by sprinkling at the site of compaction, if necessary. If the moisture content is less or greater than optimum for compaction, the compaction operations shall not proceed except with the specific approval of the Engineer, until the material has been wetted or allowed to dry out, as may be required, to obtain optimum moisture content within the tolerances permitted above, and no adjustment in price will be made on account of any operations of the Contractor in wetting or drying the materials or on account of any delays occasioned thereby.

When the material has been conditioned, it shall be compacted by rollers or by hand or power tampers. Where hand or power tampers are used to compact materials in confined areas such as under pipe or around structures they shall be equipped with suitably shaped heads to obtain the required density.

The relative density (dry) of the soil fraction in the compacted material shall not be less than 95 percent of the laboratory standard maximum soil density (dry) as determined by the Standard Proctor Compaction Test for the materials being compacted. Compaction Tests will be made by the Engineer and will be made in accordance with ASTM Designation: D698, Method A.

Cohesionless Materials. Where compaction of cohesionless free-draining materials, such as sands and gravels, is required, the materials shall be deposited in horizontal layers and compacted to the relative density specified below. The excavating and placing operations shall be such that the materials, when compacted, will be blended sufficiently to secure the highest practicable unit weight and best stability. Water shall be added to the materials as may be required to obtain the specified density by the method of compaction being used.

The thickness of the horizontal layers for compaction shall not be more than 6 inches if compaction is performed by tampers or rollers; not more than 12 inches if compaction is performed by treads of crawler-type tractors, surface vibrators, or similar equipment; and not more than the penetrating depth of the vibrator if compaction is performed by internal vibrators.

The relative density of the compacted material shall not be less than 70 percent when tested in accordance with Part B of Designation: E-12 of the Bureau of Reclamation Earth Manual, First Edition revised 1968.

Cohesionless materials containing some clay and silt may not be free draining. When compaction of cohesionless materials containing sufficient clay and silt as to impede free drainage is required, the materials shall be placed and compacted in accordance with the provisions above. These materials shall be compacted to a dry density in accordance with either of the control tests whichever shows the higher dry unit weight, as follows:

- a. Ninety-five percent of the laboratory standard maximum soil density (dry) as determined by the Standard Proctor Compaction Test, or
- b. The dry density of the material at 70 percent relative density as determined by the relative density test described above.

Measurement and Payment. Excavated material will be measured for payment in excavation to the lines shown on the Drawings or established by the Engineer, and will include only material that is actually removed at the direction of the Engineer. The material excavated will be measured by the Engineer in its original position by cross-section measurement and the volume computed by the average end area method.

The unit prices bid in the Schedule for the various items for excavation and earthwork shall include the applicable costs of all labor, equipment and materials used in clearing the area; of excavating the required materials; of drilling holes for blasting; of blasting; of performing required sprinkling; of transporting excavated materials to points of final use or to disposal areas; of transporting excavated materials to temporary stockpiles and rehandling and transporting to points of final use; of selective excavation to segregate the various excavated materials, where required; and of refilling unauthorized excess excavation or other work incidental to the Contractor's excavation and earthwork operation which are not otherwise covered by specific items of the Schedule.

Material in backfill will be measured by the Engineer, after the backfill is placed by cross-section measurement, and the volume computed by the average end area method. The unit price bid in the Schedule shall include the applicable costs of all labor, equipment and materials used in placing and compacting backfill which are not included in the work under other items of the Schedule.

No direct payment will be made under any item in the Schedule for excavating base course and gravel surfacing.

PORTLAND CEMENT, GENERAL

Scope of Work. All Portland cement required for use in concrete including concrete for mortar, grout and thermal insulation shall be furnished, transported, stored and handled in accordance with the requirements and stipulations of these Specifications unless specifically modified by the Engineer for any particular item of work.

Requirement. All cement shall be Portland cement, Type 2, unless otherwise specified in accordance with ASTM Designation: C150, and shall meet the false-set limitation specified therein. Unless otherwise permitted, cement from not more than 3 plants shall be used, and in general, only the product of one plant shall be used in any particular section of the work.

Shipment. Cement in sacks shall be delivered in strong, well-made, paper packages, each plainly marked with the manufacturer's brand. The weight of all packages shall be uniform. Packages received in broken or damaged condition shall be rejected, or accepted only as fractional packages. Shipments of sacked cement in which more than 5 percent of the sacks weigh less than 94 pounds will be cause for rejecting the entire shipment.

At the Contractor's option, cement may be delivered in bulk, providing the Contractor provides approved storage, weighing devices, and all other necessary facilities to ensure keeping the cement in good condition and affording a correct measure of the cement used in each batch, as well as in total quantity. Bulk shipments shall be made only in clean cars, trucks, or containers, and cars or trucks in which lime has been shipped shall not be used unless especially cleaned.

The Contractor, at all times, shall have at the site of the work a sufficient supply of accepted cement and shall guard against possible shortage from every cause.

Inspection and Tests. Sampling, inspection and testing of all cement will be performed by the Engineer and such sampling, inspection and testing will be in accordance with ASTM Designation: C150. The Contractor shall notify the Engineer when and where the cement is to be manufactured, and the Engineer shall have the right at all times to inspect the materials, the process of manufacture, the laboratory records of analysis and tests made at the cement plant and to take samples of the cement for testing. The Contractor shall provide all necessary assistance to the Engineer for taking of samples.

The Engineer may test the cement kept in storage at any time before use. Cement failing to pass such tests will be rejected. If any cement proves unsatisfactory and portions of it have been used in concrete, mortar, grout and thermal insulation, then such concrete, mortar, grout, and thermal insulation will be ordered removed and replaced, using

acceptable cement. Test cylinders from concrete and mortar being used in the work may be made by the Engineer at any time for purposes of testing. Cement may be accepted on the basis of the seven-day test results provided the quality history of the cement manufacturer has been established within the past 12 months, otherwise, the results of the 28-day tests at the normal testing rate must be approved prior to shipment of the cement from the plant.

Storage. The Contractor shall provide suitable storage for cement at approved places convenient to The Work, and the cement shall at all times be carefully protected against moisture and exposure to air. Cement storehouses shall be weathertight; shall have tight floors set a proper distance above ground; and shall be large enough to maintain a sufficient supply of cement on hand to prevent delays or interruptions to The Work.

To prevent undue aging of sacked cement after delivery, the Contractor shall use sacked cement in the chronological order in which it was delivered on the job. Each shipment of sacked cement shall be stored so that it may be readily distinguished from other shipments. All empty paper cement sacks shall be promptly disposed of by burning.

Measurement and Payment. Portland cement will not be measured and paid for separately, but shall be considered as incidental to the unit price bid per cubic yard for concrete, which price shall include all of the Contractor's costs of any nature, including the cost of furnishing, transporting, storing and handling the cement.

CONCRETE, GENERAL

Scope of Work. All concrete required to be used for all structures constructed under these Specifications, and for all related purposes, and as may be required by the Engineer, shall consist of the materials herein specified and shall be proportioned, mixed, formed and placed in accordance with the herein stated requirements. The strength requirements shown on the Drawings and all other stipulations and requirements herein set forth shall apply except when such stipulations and requirements are specifically modified by the Engineer, in writing, for any particular item of work.

Portland Cement. Portland cement shall be furnished, handled, stored, measured and paid for in accordance with the requirements set forth in the section, Portland Cement, General.

Production of Aggregates. Sand and coarse aggregate for concrete, and sand for mortar and grout shall be furnished by the Contractor and may be obtained by the Contractor from any approved source. Any royalties or other charges required to be paid shall be paid by the Contractor.

Approval of a deposit shall not be construed as constituting approval of all materials taken from the deposit, and the Contractor will be held responsible for the specified quality of all such materials used in The Work. The Contractor shall submit, for preliminary tests and approval, representative 100-pound samples of sand and each size of coarse aggregate proposed for use in The Work at least 14 days before the materials are required for use.

Processing of the raw materials shall include screening and washing, as necessary, to produce sand and coarse aggregate meeting the requirements hereinafter set forth. Water used for washing aggregates shall be free from objectionable quantities of silt, organic matter, alkali, salts and other impurities. The Contractor may crush oversize material and any excess material of the sizes of coarse aggregate to be furnished, until the required quantity of each size has been secured. The crushed aggregate shall be blended uniformly with the uncrushed aggregate. Crushing and blending operations shall at all times be subject to approval.

The Contractor shall handle sand and coarse aggregate so segregation and breakage will be minimized and so the aggregates will not become contaminated with soil or other foreign material. If the aggregates are stockpiled on the ground, sites for the stockpiles shall be cleared and graded evenly for drainage. The stockpiles shall be built up by depositing the aggregates directly in final position in the stockpiles and in layers not more than 4 feet deep.

The cost of producing aggregates meeting the stipulations and requirements herein set forth and required for work under this Contract, shall be included in the unit prices bid in the Schedule for the appropriate items in which the aggregates are used. The cost of producing aggregates shall include the cost of aggregate materials; all expenses of the Contractor in excavating, transporting, and storing the materials; and any other cost not specifically included in other items of the Schedule to develop the deposit.

Sand. The term "sand" is used to designate aggregate in which the maximum size of particles is 3/16-inch. Sand for concrete, mortar, and grout shall be either natural sand, or a mixture of natural sand and manufactured sand, or manufactured sand, provided the manufactured sand meets all the requirements set forth for natural sand. The sand, as delivered to the batching plant, shall have a reasonably uniform and stable moisture content. All operations for blending natural sand and manufactured sand will be subject to the approval of the Engineer at all times.

The sand shall consist of clean, hard, dense, durable, uncoated rock fragments and shall be free from injurious amounts of dust, lumps, soft or flaky particles, shale, alkali, organic matter, loam, mica and other deleterious substances. The percentages of deleterious substances in the sand, as delivered to the mixer, shall not exceed the following:

	<u>Percent, by Weight</u>
Material passing No. 200 screen.	3
Shale.	1
Coal	1
Clay lumps	1
Total of other deleterious substances such as alkali, mica, coated grains, soft flaky particles, and loam	2

The sum of the percentages of all deleterious substances shall not exceed 5 percent, by weight. Sand producing a color darker than the standard in the colorimetric test for organic impurities may be rejected. Sand having a specific gravity, saturated surface-dry basis, of less than 2.52 may be rejected. The sand may be rejected if the portion retained on a No. 50 screen, when subjected to 5 cycles of the sodium-sulfate test for soundness, shows a weighted average loss of more than 9 percent, by weight.

The sand as batched shall be well graded, and when tested by means of standard screens, shall conform to the following limits:

<u>Screen No.</u>	<u>Individual Percent, by Weight Retained on Screen</u>
4	0 to 5
8	5 to 15*
16	10 to 25*
30	10 to 30
50	15 to 35
100	12 to 20
Pan	3 to 7

*If the individual percent retained on the No. 16 screen is 20 percent or less, the maximum limit for the individual percent retained on the No. 8 screen may be increased to 20 percent.

The Engineer will test the sand by methods of test described in the seventh edition of the Bureau of Reclamation Concrete Manual, and the Contractor shall provide such facilities as may be necessary for procuring representative test samples.

Coarse Aggregate. The term "coarse aggregate" is used to designate aggregate that is reasonably well graded from 3/16 inch to 3 inches or any size or range or sizes within such limits. Coarse aggregate for concrete shall consist of natural gravel or crushed rock or a mixture of natural gravel and crushed rock.

The coarse aggregate shall consist of clean, hard, dense, durable, uncoated rock fragments. The percentages of deleterious substances in any size of coarse aggregate, as delivered to the mixer, shall not exceed the following:

	<u>Percent, by Weight</u>
Material passing No. 200 screen	0.5
Shale	1.0
Coal	1.0
Clay lumps.	0.5
Other deleterious substances.	1.0

The sum of the percentages of all deleterious substances in any size, as delivered to the mixer, shall not exceed 3 percent, by weight. Coarse aggregate may be rejected if it fails to meet the following test requirements:

- a. Abrasion test. If the loss using Grading A exceeds 10 percent, by weight, at 100 revolutions or 42 percent, by weight, at 500 revolutions.
- b. Specific gravity. If the specific gravity (saturated surface-dry basis) is less than 2.52.
- c. Sodium-sulfate test for soundness. If the weighted average loss after 5 cycles is more than 10 percent, by weight.

The coarse aggregate shall be separated into nominal sizes and shall be graded as follows:

<u>Designation of Size</u>	<u>Nominal Size Range</u>	<u>Minimum Percent Retained on Screens</u>
3/4"	3/16" - 3/4"	Not less than 50% or more than 65% on 3/8" screen
1 1/2"	3/4" - 1 1/2"	25% on 1 1/4" screen
3"	1 1/2" - 3"	25% on 2 1/2" screen

Separation of the coarse aggregate shall be such that, when the aggregate, as batched, is tested by screening on the screens hereinafter designated, the material passing the undersized test screen (significant undersize) shall not exceed 3 percent, by weight, and all material shall pass the oversize test screen. Undersize and oversize test screens shall be screens having square openings 5/6 and 7/6 respectively, of the nominal screen openings for each size fraction. If necessary, to meet the foregoing requirements for significant undersize, the coarse aggregate shall be finished-screened at the batching plant. Screens used in making the tests for undersize and oversize will conform to the requirements of ASTM Designation: E11, with respect to permissible variations in average openings.

The Engineer will test the coarse aggregate by methods of test described in the seventh edition of the Bureau of Reclamation Concrete Manual, and the Contractor shall provide such facilities as may be necessary for procuring representative test samples.

Water. The water used in concrete, mortar, and grout shall be free from objectionable quantities of silt, organic matter, alkali, salts and other impurities.

Admixtures. The Contractor shall furnish and use an air-entraining admixture in all concrete. The air-entraining admixture used shall conform to the requirements of ASTM Designation: C260, and shall be of uniform consistency and quality within each container and from shipment to shipment. Air-entraining admixtures will be accepted on manufacturer's certification of conformance with Specifications, but such acceptance shall in no way relieve the Contractor of responsibility for furnishing an air-entraining admixture meeting Specification requirements. Air-entraining admixtures will be subject to sampling and testing by the Engineer after delivery at the jobsite.

The amount of air-entraining admixture used shall be such as will effect the entrainment of from 4 to not more than 6 percent of air, by volume, of the concrete as discharged from the mixer. The admixture shall be added to the batch in solution in a portion of the mixing water. The solution shall be batched by means of a mechanical batcher capable of accurate measurement and in such a manner as will ensure uniform distribution of the agent throughout the concrete batch during the specified mixing period.

A suitable water-reducing, cement-dispersing admixture approved by the Engineer shall be furnished and used in all concrete. When approved by the Engineer, the Contractor may also furnish and use a retarding or accelerating admixture at the Contractor's option and expense. The water-reducing and retarding or accelerating admixtures shall conform to the requirements of ASTM Designation: C494, and will be subject to sampling and testing by the Engineer. Tests shall be performed by the Contractor to determine the amounts of admixtures to be used in The Work.

Composition of Concrete. Concrete shall be composed of Portland cement, sand, coarse aggregate, water, and admixtures as specified, all well mixed and brought to the proper consistency. The maximum size of coarse aggregate in concrete for any part of the work shall be the largest of the specified sizes, the use of which is practicable from the standpoint of satisfactory placement and consolidation of the concrete.

The mix proportions and appropriate water-cement ratio will be determined on the basis of procuring concrete having suitable workability, density, impermeability, durability, and required strength, without the use of an excessive amount of cement. The net water-cement ratio for concrete used in structures (exclusive of water within or absorbed by the aggregates) shall not exceed 0.40 for 4,000 psi concrete or 0.50 for 3,000 psi concrete, by weight, except a greater water-cement ratio may be used if approved by the Engineer provided the relationship between strength and water-cement ratio for the materials to be used has been previously established by reliable test data and the resulting concrete conforms to the specified strength requirements. Tests of the concrete will be made by the Engineer and the mix proportions shall be changed whenever necessary for the purpose of securing the required economy, workability, density, impermeability, durability and strength, and the Contractor shall be entitled to no additional compensation because of such changes.

The amount of water used in the concrete shall be changed as required to secure concrete of the proper consistency and to adjust for any variation in the moisture content or grading of the aggregates as they enter the mixer. Addition of water to compensate for stiffening of the concrete before placing will not be permitted. Uniformity in concrete consistency from batch to batch will be required. The slump of the concrete used in structures, after the concrete has been deposited but before it has been consolidated, shall not exceed 4 inches.

The compressive strength of the concrete will be determined by the Engineer through the medium of tests of 6-inch by 12-inch cylinders, made and tested in accordance with Designations 29 to 33, inclusive, of the seventh edition of the Bureau of Reclamation Concrete Manual. Slump tests will be made by the Engineer in accordance with Designation 22 of the said Bureau of Reclamation Concrete Manual. The Contractor

shall provide such facilities as may be necessary for procuring and handling representative test samples. The cost of all concrete furnished for testing shall be included in the unit prices bid in the Schedule for the appropriate items for which the testing applies. The frequency of tests will be determined by the Engineer on the basis of placement rate, but no more often than necessary to ensure the concrete being placed conforms to the Specifications and design requirements.

Batching. The Contractor shall provide such means and equipment as are required to determine accurately and to control the amount of each separate ingredient entering the concrete. Such means and the equipment and its operation shall at all times be subject to approval by the Engineer. The amounts of bulk cement, sand, and each size of coarse aggregate entering each batch of concrete shall be determined by weighing. The amount of water shall be determined by weighing or by volumetric measurement. Where sacked cement is used, the concrete shall be proportioned on the basis of integral sacks of cement, unless the cement is weighed.

The batching equipment shall be capable of ready adjustment for compensating for the varying weight of any moisture contained in the aggregates and for effecting changes in concrete mix proportions. Batching equipment shall be constructed and operated so that the combined inaccuracies in feeding and measuring the materials will not exceed 1 percent for water, 1-1/2 percent for weighed cement, 2 percent for sand, 3/4-inch and 1 1/2-inch aggregate, and 3 percent for 3-inch coarse aggregate. Cement shall be weighed in an individual weighing hopper. Scales for weighing cement shall be equipped with an accurate recorder for registering the weight of cement used in each batch of concrete. The recorder shall be housed completely and shall be capable of being locked. The recorder paper shall be furnished by the Contractor, and after completion of recording, shall become the property of the Owner.

The Contractor shall provide standard test weights and any other auxiliary equipment required for checking the operating performance of each scale, or other measuring device, and shall make periodic tests over the ranges of measurements involved in the batching operations. The tests shall be made in the presence of the Engineer, and the test procedure shall be subject to approval. The Contractor shall immediately make such adjustments, repairs or replacements as may be necessary to meet the specified requirements for accuracy of measurement.

The operating mechanism in the water-measuring device shall be such that leakage will not occur when the valves are closed. Water tanks on portable mixers shall be constructed so that the indicating device will register, within the specified limit of accuracy, the quantity of water discharged, regardless of the inclination of the mixer setting. Where the batching plant involves the use of storage bins and weighing hoppers, each weighing unit shall include a visible springless dial which will register the scale load at any stage of the weighing operation from zero to full capacity or shall include an over-and-under indicator which will show the scale in balance with no

load or when loaded at any desired beam setting. The weighing hoppers shall be constructed so as to permit the convenient removal of overweight material in excess of the prescribed tolerances. Each dial, or over-and-under indicator, and each water measuring device shall be in full view of the operator.

Mixing Concrete. The concrete ingredients shall be mixed in a batch mixer for not less than 1 1/2 minutes after all ingredients, except the full amount of water, are in the mixer. The Engineer reserves the right to increase the mixing time when the charging and mixing operations fail to produce a concrete batch throughout which the ingredients are uniformly distributed and the consistency is uniform. The concrete shall be uniform in composition and consistency from batch to batch except when changes in composition or consistency are required. Water shall be added prior to, during, and following the mixer-charger operations. Excessive overmixing requiring the addition of water to preserve the required concrete consistency will not be permitted. Any mixer that at any time produces unsatisfactory results shall be repaired promptly and effectively or shall be replaced. Mixers shall not be loaded in excess of their rated capacity. Each mixer shall be equipped with a mechanically operated timing and signaling device which will indicate and assure the completion of the required mixing period and will count the batches.

If approved by the Engineer, a pumpcrete system with suitable re-mixer may be used for placing concrete, and the mixing time may be cut to one minute after all ingredients, except the full amount of water, are in the mixer.

Truck Mixers. Truck mixers shall be of the revolving drum type, watertight and so constructed that the concrete can be so mixed as to ensure a uniform distribution of materials throughout the mass. All solid materials for the concrete shall be accurately measured in accordance with the foregoing requirements and charged into the drum at the proportioning plant. Each truck mixer shall be equipped with a tank for carrying the mixing water. Each truck mixer shall be equipped with: (1) an accurate water meter between supply tank and mixer, the meter to have indicating dials and totalizer, and (2) a reliable revolution counter, which can be readily reset to zero for indicating the total number of revolutions of the drum for each batch.

Mixing shall be continued for not less than 50 nor more than 100 revolutions of the drum at the manufacturer's rated mixing speed after all the ingredients, except approximately 5 percent of the water which may be withheld, are in the drum. The mixing speed shall be not less than 5 nor more than 20 rpm. Thereafter, additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as the agitating speed; except that after the addition of the withheld water, mixing shall be continued at the specified mixing speed until the water is dispersed throughout the mix. After a period of agitation a few revolutions of the drum at mixing speed will be required just prior to discharging. In no case shall the specified maximum net water-cement ratio be exceeded.

When a truck mixer or agitator is used for transporting concrete, the concrete shall be delivered to the site and the discharge completed within 1½ hours after the introduction of the cement into the mixer. Each batch of concrete, when delivered at the jobsite from commercial ready mix plants, shall be accompanied by a written certificate of batch weights and time of batching.

Mixers shall be examined daily for changes in condition due to accumulation of hard concrete or mortar or to wear of blades. No mixer shall be charged in excess of its rated capacity for mixing or agitating; however, if any mixer cannot produce concrete meeting the requirements heretofore specified when mixing at rated capacity, within the specified limitation on the number of revolutions of the mixing drum at mixing speed, the size of batch mixed shall be reduced until an acceptable performance is obtained.

Temperature of Concrete. The temperature of concrete when it is being placed shall be not more than 90°F and not less than 40°F. When the temperature of the concrete as placed will be between 80°F and 90°F, the concrete shall be mixed at the jobsite and discharged into the work immediately after mixing.

If concrete is placed when the weather is such that the temperature of the concrete would exceed 90°F, as determined by the Engineer, the Contractor shall employ effective means, such as precooling of aggregates and mixing water and placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90°F.

Form Construction. Forms to confine the concrete and shape it to the required lines shall be used whenever necessary. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete, and shall be maintained rigidly in position. Forms shall be of metal, metal-lined timber, fir plywood lining, tempered pressed wood lining, or smooth planed boards in good condition, as required to produce the specified surface finish.

The smoothest practicable finish surface of the concrete will be required wherever it is a part of a waterway. The forms for waterway surfaces may be made of either wood or metal. All forms shall be true in every respect to the required shape and size, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. All wood forms on waterway surfaces shall be planed and sanded to eliminate form marks insofar as practicable.

Suitable and effective means shall be provided in the construction of all forms for holding adjacent edges and ends of panels tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets and similar surface defects in the finished concrete.

All forms when erected shall be tight. Adequate and suitable means for removing the forms without injury to the surface of the finished concrete shall be provided. Before concrete is placed, the surfaces

of the forms shall be oiled with a commercial form oil that will effectively prevent sticking of the concrete to the forms and will not stain the concrete. Any other bond breaking material or process shall be used only after approval by the Engineer. All forms shall be properly secured in position so as to prevent floating, or other movement, during the placing of concrete. They may be supported during placement of concrete on concrete piers, metal pedestals, or by other approved means. Concrete supports shall be carried to firm foundation so that no settlement of the forms will be possible during construction. Inspection of the forms by the Engineer shall not relieve the Contractor of responsibility for the adequacy of the forms or for remedying any defects which may develop or become apparent with use. The Engineer may at any time condemn any sections of forms found deficient in any respect.

Placing Concrete. No concrete shall be placed until all formwork, reinforcement, installation of parts to be embedded, bracing of forms, and preparation of surfaces involved in the placing have been approved. No concrete shall be placed in water, except with the written permission of the Engineer, and the methods of depositing the concrete shall be subject to approval. Concrete shall not be placed in running water and shall not be subjected to the action of running water until after the concrete has sufficiently hardened. All surfaces of forms and embedded materials that have become encrusted with dried mortar or grout from concrete previously placed shall be cleaned of all such mortar or grout before the surrounding or adjacent concrete is placed.

Immediately before placing concrete, all surfaces upon or against which the concrete is to be placed shall be free from standing water, mud, debris or loose material. The surfaces of absorptive materials against or upon which concrete is to be placed shall be moistened thoroughly so that moisture will not be drawn from the freshly placed concrete.

Concrete surfaces upon or against which concrete is to be placed, and to which new concrete is to adhere, that have become so rigid that the new concrete cannot be incorporated integrally with it, are defined as construction joints. The surfaces of construction joints shall be clean, rough, and surface dry when covered with fresh concrete or mortar. Cleaning shall consist of the removal of all laitance, loose or defective concrete, coatings, or foreign material. The surfaces of construction joints shall be wet sand-blasted and then washed thoroughly with high pressure air-water jets immediately prior to placement of fresh concrete. The sand blasting and washing shall be performed at the last opportunity prior to placement of concrete. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.

The surfaces of all contraction joints shall be cleaned thoroughly of accretions of concrete or other foreign material by scraping, chipping, or by other means satisfactory to the Engineer.

The methods and equipment used for transporting concrete shall be such that concrete having the required composition and consistency will be delivered to The Work, without objectionable segregation or loss of slump.

Concrete shall be placed only in the presence of the Engineer. After the surfaces have been prepared satisfactorily, construction joints upon which new concrete is to be placed shall be covered with a layer of mortar approximately 3/8-inch thick. The mortar shall have the same proportions of cement and sand as the regular concrete mixture, unless otherwise directed. The water-cement ratio of the mortar shall not exceed that of the concrete to be placed upon it, and the consistency of the mortar shall be suitable for placing and working in the manner hereinafter specified. The mortar shall be spread uniformly and shall be worked thoroughly into all irregularities of the surface. Concrete shall be placed immediately upon the fresh mortar. In placing concrete against formed construction joints, special precautions shall be taken to ensure that the new concrete is brought into intimate contact with the surface of the joint by careful puddling and spading with the aid of suitable tools.

Retempering of concrete will not be permitted. Any concrete which has become so stiff that proper placing cannot be assured shall be wasted and no payment will be due the Contractor for such wasted concrete, including the cement.

Concrete shall be deposited in all cases as nearly as practicable directly in its final position and shall not be caused to flow in a manner to permit or cause segregation. Excessive separation of coarse aggregate in concrete, caused by allowing the concrete to fall freely from too great a height, or at too great an angle from the vertical, or to strike the forms or reinforcement steel, will not be permitted, and where such separation would otherwise occur, the Contractor shall provide suitable drop chutes and baffles to confine and control the falling concrete.

Removal of Forms. The time and method of removal and moving of forms shall be approved by the Engineer and shall be done with care so as to avoid injury to the concrete. No loading on green concrete will be permitted. As soon as the forms are removed, the surface of the concrete shall be carefully examined, and any irregularities in the surface shall be repaired to the satisfaction of the Engineer.

Curing. All concrete in structures shall be cured by membrane curing, as hereinafter specified, except that construction joints shall be cured only by water curing.

Concrete cured with water shall be kept wet for at least 14 consecutive days immediately following placement of the concrete, by covering with water-saturated material, or by a system of perforated pipes, mechanical sprinklers, or porous hose, or by any other approved method, which will keep all surfaces to be cured continuously (not periodically) wet. Water used for curing shall meet the requirements of these Specifications for water used for mixing concrete.

Membrane curing shall consist of the application of a white-pigmented sealing compound which forms a water-retaining membrane on the surface of the concrete. The sealing compound shall conform to Bureau of Reclamation "Specifications for Sealing Compound for Curing Concrete," effective June 1, 1961. At the time of use, the sealing compound shall be in a thoroughly stirred condition such that the pigment is uniformly dispersed throughout the vehicle. Stirring shall be accomplished by an effective power-operated mechanical stirrer, or by agitation with compressed air introduced at the bottom of the drum through a length of pipe, or by other approved means. Compressed air lines shall be provided with effective traps to prevent oil or moisture from getting into the compound. The sealing compound shall not be diluted or altered in any manner.

The sealing compound shall be applied to the concrete surfaces by spraying and shall be applied in one coat at a coverage of 150 square feet per gallon. Spraying equipment shall be of the pressure-tank type, which provides for continual agitation of sealing compound during spraying operations. The use of ordinary orchard-type hand sprayers will not be permitted. In order to insure thorough and complete coverage of the concrete surfaces, approximately one-half of the required thickness of coating shall be applied by moving the spray gun back and forth in one direction with the remainder of the coating applied immediately thereafter by moving the gun at right angles to the direction of the first application.

When a sealing compound is used on unformed concrete surfaces, application of the compound shall commence immediately after finishing operations are completed. When a sealing compound is to be used on formed concrete surfaces, the surfaces shall be moistened with a light spray of water immediately after the forms are removed and shall be kept wet until the surfaces will not absorb more moisture. As soon as the surface film of moisture disappears and there is an approach to surface dryness, the sealing compound shall be applied. In the event that application of the sealing compound is delayed, the concrete surfaces shall be kept continually moist until the sealing compound is applied or until the specified period of water curing has elapsed. Special care shall be taken to ensure ample coverage with the compound at edges, corners, and rough spots of formed surfaces.

After the application of the sealing compound has been completed and the coating is dry to touch, any required patching of concrete surfaces shall be performed. Each patch, after being finished, shall be moistened and coated with sealing compound in accordance with the foregoing requirements. Traffic and other operations by the Contractor shall be such as to avoid damage to coatings of sealing compound for a period of not less than 28 days. Where it is impossible because of construction operations to avoid traffic over surfaces coated with sealing compound, the membrane shall be protected by a covering of sand, or earth, not less than one inch in thickness or by other effective means. The protective covering shall not be placed until the sealing membrane is completely dry. Before final acceptance of the work, the Contractor shall remove all sand or earth covering. Any damage to the sealing membrane within 28 days after application shall be repaired without delay and in a manner acceptable to the Engineer.

The sealing compound the Contractor proposes to use shall be made available for sampling 14 days prior to use, and no sealing compound shall be used until it has been approved by the Engineer. The Contractor shall provide representative test samples.

Protection of Concrete. The Contractor shall protect all concrete against injury until final acceptance by the Owner. Exposed surfaces of all concrete, except surfaces of concrete coated with white-pigmented sealing compound, shall be protected from the direct rays of the sun for at least the first 3 days after placing. Such protection shall be made effective as soon as practicable after the placing of unformed concrete or after the removal of forms from formed concrete.

If the concrete is placed when the surrounding temperature may be less than 40°F, the concrete shall be maintained at a temperature of at least 50°F for not less than 72 hours after it is placed and shall be protected from freezing, by means approved by the Engineer, for at least 2 weeks after being placed. Concrete shall be considered as exposed to freezing when the wet bulb temperature at the structure site drops to 32°F. Where artificial heat is employed, special care shall be taken to prevent the concrete from drying.

Finishes and Finishing. The classes of finish and the requirements for finishing of concrete surfaces shall be as specified herein. Finishing of concrete surfaces shall be performed only by skilled workmen and in the presence of the Engineer. Concrete surfaces will be tested by the Engineer where necessary to determine whether surface irregularities are within the limits hereinafter specified. Surface irregularities are classified as "abrupt" or "gradual." Offsets caused by displaced or misplaced form sheathing, or lining, or form sections, or by loose knots in forms, or otherwise defective form lumber, will be considered as abrupt irregularities, and will be tested by direct measurement. All other irregularities will be considered as gradual irregularities, and will be tested by use of a template, consisting of a straightedge or the equivalent thereof for curved surfaces. The length of the template will be 5 feet for testing of formed surfaces and 10 feet for testing of unformed surfaces. Before final acceptance of The Work, the Contractor shall clean all exposed surfaces, unless otherwise specified, of unsightly encrustations and stains.

Formed Surfaces. Unless otherwise specified, the classes of finish shall apply as follows:

- a. Formed surfaces upon or against which backfill or concrete is to be placed will require no treatment after form removal except for the repair of defective concrete. Correction of surface irregularities will be required for depressions only, and only for those which, when measured as described herein, exceed one inch.
- b. Submerged and below ground formed surfaces which are not exposed to the action of flowing water and are not prominently exposed to view will require no treatment except for repair

of surface imperfections. Surface irregularities, measured as described herein, shall not exceed 1/4-inch for abrupt irregularities and 1/2-inch for gradual irregularities.

- c. Above ground formed surfaces of structures, which are prominently exposed to view but not exposed to the action of flowing water shall have forms constructed skillfully and accurately of plywood sheets. Steel lining will not be permitted. There shall be no visible offsets, bulges, or misalignments of concrete. Surface irregularities, measured as described herein, shall not exceed 1/8-inch for abrupt irregularities and 1/4-inch for gradual irregularities.
- d. The formed surfaces of all waterway passages shall have forms constructed of wood or metal. The forms shall be strong and held rigidly and accurately to the correct alignment. Surface irregularities, measured as described herein, shall not exceed 1/8-inch for abrupt irregularities and 1/4-inch for gradual irregularities. All abrupt irregularities shall be removed by grinding and sack rubbing to the satisfaction of the Engineer.

Unformed Surfaces. Interior surfaces shall be sloped for drainage where shown on the Drawings or directed by the Engineer. Unless otherwise specified, classes of finish shall apply as follows:

- a. Unformed surfaces that will be covered by backfill or concrete shall be finished by sufficient leveling and screeding to produce an even uniform surface. Surface irregularities, measured as described herein, shall not exceed 3/8-inch.
- b. A hard steel trowel finish shall be applied to unformed surfaces that will be exposed to view or that will be subjected to the action of flowing water. Floating and troweling may be performed by use of hand or power-driven equipment. Floating and troweling shall be started as soon as the screeded surface has stiffened sufficiently, and shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture. Surface irregularities, measured as described herein, shall not exceed 1/4-inch for gradual irregularities and no trowel marks or abrupt irregularities will be permitted. Joints and edges shall be tooled.

Repairing Concrete Surfaces. If, after stripping of forms, any concrete is found to be not formed as shown on the Drawings, or is out of alignment or level, or shows a defective surface, it shall be considered as not conforming with the intent of these Specifications and shall be removed and replaced by the Contractor at its expense unless the Engineer grants permission to patch the defective area, in which case patching shall be done as described in the following paragraphs

Defects that require replacement or repair are those that consist of honeycomb, damage due to stripping of forms, loose pieces of concrete,

bolt-holes, tie-rod holes, ridges at form joints, and bulges due to movement of the forms. Ridges and bulges shall be removed by chipping or tooling followed by rubbing with a grinding stone. Honeycomb and other defective concrete shall be chipped out, the chipped openings being sharp-edged and shaped so that the filling will be keyed in place. All holes shall be thoroughly moistened for several hours before the filling is placed. The surface of the filling shall be finished flush with the surrounding wall, and shall have the same texture. All patches shall be cured.

Imperfections, bolt and tie-rod holes, and the chipped-out honeycomb areas to be repaired shall be filled with drypatching mortar composed of one part of Portland cement to two parts of regular concrete sand (volume measurement) together with "EMBECO" (or equal) in the amount of 15 pounds per bag of cement, and just enough water so that, after the ingredients are mixed thoroughly, the mortar will stick together on being moulded into a ball by slight pressure of the hands and will not exude free water. Mortar repairs shall be placed in thin layers and thoroughly compacted by suitable tools. Care shall be taken in filling rod, bolt, and pipe holes so that the entire depth of the hole is completely filled with compacted mortar.

Construction Joints. The location of all construction joints will be subject to the approval of the Engineer and the joints shall be constructed in accordance with the provisions of the paragraph, Placing Concrete.

Measurement and Payment. Measurement for payment of concrete required to be placed directly upon or against surfaces of excavation will be made to the lines for which payment for excavation is made. Measurement for payment of other concrete will be made to the neat lines of the structures, unless otherwise specifically shown on the Drawings or prescribed in these Specifications. In measuring concrete for payment, the volume of openings, recesses, ducts, embedded pipes, and metalwork, each of which is larger than 100 square inches in cross section, will be deducted.

Payment for concrete required under these Specifications will be made at the unit prices bid therefor in the Schedule, which unit prices shall include all of the Contractor's costs, including but not limited to, the cost of materials, such as water, admixtures, sand, aggregates, curing compound, forms, form oil, materials for finishing and repairing concrete surfaces, and all other materials, including cement and reinforcement, and the costs incidental to their use; the costs of all operations of batching, mixing, temperature control, transportation, preparation for placing, placing, design and construction and removal of forms, curing, protection, finishing and repairing concrete surfaces, constructing joints, and all other operations, procedures, stipulations, and requirements set forth herein.

REINFORCEMENT, GENERAL

Scope of Work. All reinforcement required to be used in concrete constructed under these Specifications, and for all related purposes as may be required by the Engineer, shall be furnished, cut, bent, fabricated and placed in accordance with the Drawings and requirements and stipulations of these Specifications unless specifically modified by the Engineer.

Requirement. All reinforcement shall be new, shall be approved by the Engineer, and shall conform to the following standards:

- a. Reinforcement shall be deformed bars having a yield strength of 40,000 psi minimum, in accordance with ASTM Designation: A615, Grade 40.
- b. The fabrication, cleaning, placing, spacing, bending, and splicing of reinforcement shall conform to the applicable provisions of the Standard Building Code Requirements for Reinforced Concrete, published June 1963, by the American Concrete Institute, unless otherwise shown on the Drawings or directed by the Engineer.

Fabrication and Cleaning. Before the reinforcement is embedded in concrete, the surfaces of the bars and the surfaces of any bar supports shall be free of loose rust and mill scale and from coatings that destroy or reduce bond with the concrete.

Reinforcement shall be accurately formed to the dimensions indicated on the Drawings. All bars shall be bent cold. Reinforcement shall not be straightened or rebent in a manner that will injure the material. Bars with kinks or bends not shown on the Drawings shall not be used. Heating of the reinforcement will be permitted only when the entire operation is approved by the Engineer.

Placing. Reinforcement shall be accurately positioned and secured against displacement by using annealed iron wire ties or suitable clips at intersections, and shall be supported by concrete or metal supports, spacers, and hangers. In all cases sufficient supports for horizontal reinforcement shall be used so that there will be no sagging of the bars.

Reinforcement in slabs on the ground shall be supported by an approved method. The reinforcement in all other slabs and in beams shall be supported by means of metal chairs.

At those surfaces of footings, slabs, walls and other principal structural members in which concrete is deposited directly against the foundation, reinforcement shall have a minimum covering of 3 inches of concrete. At other surfaces of concrete, reinforcement shall be protected by a concrete cover of not less than 2 inches, unless otherwise shown on the Drawings.

Reinforcement will be inspected for compliance with requirements as to size, shape, length, splicing, position, and amount after it has been placed.

Measurement and Payment. Reinforcement will not be measured and paid for separately, but shall be considered as incidental to the unit price bid per cubic yard for concrete.

SPECIAL PROVISIONS
ALTERNATE SITE EMPOUNDMENT AREA DAM

CARE OF WATER AND
UNWATERING FOUNDATIONS

Scope of Work. The work to be done under Care of Water and Unwatering Foundations, Item 1, includes the following:

- a. Protecting the works constructed for the Alternate Site Empoundment Area Dam from damage by rains, floods and similar events during the entire construction period.
- b. Furnishing, placing and operating pumping and other unwatering equipment for maintaining the foundations, including cutoff trenches, of Alternate Site Empoundment Area Dam and outlet works; south abutment cutoff; north abutment cutoff; and the foundations of all other structures free of water as required for proper construction.

The Contractor shall furnish all materials, construct protective works, furnish pumping and other equipment, and perform all operations for protecting the work, maintaining flow in channels, diverting flow, and caring and handling of water in accordance with the Drawings and these Specifications.

Protection of Works. The Contractor shall protect all works constructed for the Alternate Site Empoundment Area Dam from damage by rains, surface runoff, floods, flow and overflow of drainage channels, flow through permanent structures, flow due to failure of protective work, and similar events which may occur within the area during the entire construction period. The Contractor shall plan and schedule its operations to minimize the danger of such damage and construct or provide all protective works to prevent damage. Any damage to the works constructed for the Alternate Site Empoundment Area Dam whether or not due to the Contractor's failure to adequately take all dangers into consideration, shall be corrected by the Contractor, and will not constitute a basis for claims for additional payment or extension of time.

After having served their purpose, all protective works shall be removed or leveled as approved by the Engineer.

Maintaining Flow. As detailed in the soils and geologic report which is on file with the Engineer, no flow will be intentionally diverted to Alternate Site Empoundment Area Dam during the construction period. It is possible that storm water flow will collect at Alternate Site Empoundment Area Dam from the tributary drainage area. Accordingly, the Contractor shall take whatever measures necessary to insure that such storm flows will cause no damage. All operations and works necessary to maintain flow in existing channels, or any temporary or permanent channel relocations therefor, during the entire construction period shall be performed or provided by the Contractor. Any damage to the permanent works due to the failure of works provided by the Contractor for maintaining flow shall be repaired by the Contractor.

Unwatering Foundations. The Contractor shall furnish, install, maintain and operate all necessary pumping and other equipment for unwatering the various parts of the work and for maintaining the foundations free from water as required for construction of each part of the works constructed for the Alternate Site Empoundment Area Dam. The Contractor's method of removal of water from the foundations will be subject to the approval of the Engineer. If excavation for the foundations, cutoff trenches, and other structures extends below the water table, the portion below the water table shall be dewatered in advance of excavation. The dewatering shall be accomplished in a manner that will prevent loss of fines from the foundation, will maintain stability of excavated slopes in the bottom of the excavation, will result in all construction operations being performed free from standing water, will result in all foundations being sufficiently dry for proper bonding of the embankment materials with the foundations, and will permit proper compaction of the embankment materials. The Contractor will be required to control any seepage along the bottom of the cutoff trenches, and elsewhere so as to limit the moisture content of embankment materials placed in the cutoff trenches at the time of compaction to that specified herein for embankment construction of corresponding materials.

Measurement and Payment. No quantity measurement will be made of the work performed for care of water and unwatering foundations, and payment therefor will be based on completion of the work specified herein and on the Drawings.

Payment for care of water and unwatering foundations will be made at the lump sum price bid in the Schedule for Item 1, Care of Water and Unwatering Foundations.

The amount bid shall be full payment for completion of the work specified herein and elsewhere in these Specifications and on the Drawings for Item 1, Care of Water and Unwatering Foundations, and shall include all of the Contractor's costs of whatsoever nature.

No payment for work performed under this item of the Specifications will be made until a payment schedule has been approved by the Engineer. The payment schedule shall indicate the portion of the total lump sum amount applicable to each of the categories of work "a" through "c" under "Scope of Work", and for category "c" the amount shall be broken down to indicate the amount applicable to each individual structure.

EXCAVATION, UNCLASSIFIED, STRIPPING
FOUNDATIONS

Scope of Work. The work to be done under Excavation, Unclassified, Stripping Foundations, Item 2, consists of performing stripping excavation for the removal of unsuitable materials from the surfaces of foundations in accordance with the Drawings and these Specifications. Unless otherwise directed by the Engineer, the areas to be excavated shall include the areas to be occupied by the foundation and abutments of Alternate Site Empoundment Area Dam and other areas designated by the Engineer. Stripping excavation shall be limited to the areas which require stripping for proper construction of the works.

All excavation below the stripping excavation shall be included in the work under other items of the Schedule.

General. Except as otherwise provided herein, all excavation for stripping foundations shall be made to the alignments, grades and dimensions shown on the Drawings or established by the Engineer and shall be in complete conformity with the applicable requirements set forth in the section, Excavation and Earthwork, General.

Requirement. The materials to be removed by stripping excavation shall include debris, slopewash, loam, topsoil, vegetable matter, stumps, roots, and other materials that are unsuitable for use in permanent construction required under these Specifications or that might interfere with the proper bonding of the embankment with the foundation, or the proper compacting of the materials in the embankment, or that may be otherwise objectionable as determined by the Engineer. The limits of stripping excavation, including depth of cut, shall be as directed by the Engineer. Materials removed by stripping excavation shall be placed in disposal areas designated by the Engineer.

Measurement and Payment. Measurement for payment for excavation, unclassified, stripping foundations will be made of the material in excavation only to the lines, grades and dimensions shown on the Drawings or established by the Engineer.

Payment for excavation, unclassified, stripping foundations will be made at the unit price per cubic yard bid in the Schedule for Item 2, Excavation, Unclassified, Stripping Foundations.

The amount bid shall be full payment for completion of the work specified herein and elsewhere in these Specifications and on the Drawings for Item 2, Excavation, Unclassified, Stripping Foundations, and shall include all of the Contractor's costs of whatsoever nature.

STRIPPING
BORROW AREAS
ITEM 3

EXCAVATION, UNCLASSIFIED, STRIPPING BORROW AREAS

Scope of Work. The work to be done under Excavation, Unclassified, Stripping Borrow Areas, Item 3, consists of performing stripping excavation for the removal of unsuitable materials from the surfaces of borrow areas in accordance with the Drawings and these Specifications. Stripping excavation of borrow areas shall be limited to the areas which are required to obtain sufficient quantities of embankment material, concrete aggregates, base course, and gravel surfacing for the works constructed for the Alternate Site Empoundment Area Dam.

All excavation below the stripping excavation shall be included in the work under other items of the Schedule.

General. Except as otherwise provided herein, all excavation for stripping borrow areas shall be made to the alignments, grades and dimensions shown on the Drawings or established by the Engineer and shall be in complete conformity with the applicable requirements set forth in the section, Excavation and Earthwork, General.

Requirement. The materials to be removed by stripping excavation shall include debris, slopewash, loam, topsoil, vegetable matter, stumps, roots, and other materials that are unsuitable for use in permanent construction required under these Specifications or that might interfere with the proper bonding of the embankment with the foundation, or the proper compacting of the materials in the embankment, or that may be otherwise objectionable as determined by the Engineer. The limits of stripping excavation, including depth of cut, shall be directed by the Engineer. Materials removed by stripping excavation shall be placed in disposal areas designated by the Engineer.

Measurement and Payment. Measurement for payment for excavation, unclassified, stripping borrow areas will be made of the material in excavation only to the lines, grades and dimensions shown on the Drawings or established by the Engineer.

Payment for excavation, unclassified, stripping borrow areas will be made at the unit price per cubic yard bid in the Schedule for Item 3, Excavation, Unclassified, Stripping Borrow Areas.

The amount bid shall be full payment for completion of the work specified herein and elsewhere in these Specifications and on the Drawings for Item 3, Excavation, Unclassified, Stripping Borrow Areas, and shall include all of the Contractor's costs of whatsoever nature.

EXCAVATION, UNCLASSIFIED, FOR
ALTERNATE SITE EMPOUNDMENT AREA DAM

Scope of Work. The work to be done under Excavation, Unclassified, for Alternate Site Empoundment Area, Item 4, consists of performing all excavation for the foundation, abutments and outlet works for Alternate Site Empoundment Area Dam except excavation included under Item 3, Excavation, Unclassified, Stripping Foundations, and Item 5, Excavation for Abutment Cutoffs, in accordance with the Drawings and these Specifications. The work to be done by the Contractor includes excavation for the dam foundation, abutments and abutment cutoff trenches, transporting the excavated material to the dam embankment or to temporary stockpiles, from temporary stockpiles to points of final use, and to designated disposal areas; rehandling of materials which cannot be placed in the dam embankment directly from the excavation; and placing material not suitable or required for the permanent works in designated disposal areas.

General. Except as otherwise provided herein, all excavation, unclassified, for dam works shall be made to the alignments, grades and dimensions shown on the Drawings or established by the Engineer and shall be in complete conformity with the applicable requirements set forth in the section, Excavation and Earthwork, General.

It is anticipated that nearly all materials below the lines of stripping excavation are suitable materials for use in the Alternate Site Empoundment Area Dam embankment. All suitable embankment materials shall be placed in the designated final locations of the dam embankment directly from the excavation, or shall be placed in temporary stockpiles and later placed in the designated locations as directed by the Engineer. In excavating materials which are suitable for use in the dam embankment, the Engineer will designate the depths of cut which will result in the best gradation of materials, and the cuts shall be made to such designated depths. Excavated materials which are unsuitable for or are in excess of the dam embankment or other earthwork requirements, as determined by the Engineer, shall be placed in designated disposal areas.

Excavation for the dam foundation shall be made to sufficient depth to secure foundations free from excessively weathered material, slopewash, and slide materials, and to eliminate sharp changes in slopes over the embankment contact area, or other objectionable defects, as determined by the Engineer. The excavation for the foundation of the dam shall be shaped and roughly stepped or benched where necessary, as determined by the Engineer, so as to produce the desired surface of contact between the embankment and the foundation. Accurate trimming of the slopes of the excavation will not be required.

Excavation for the abutment cutoff trenches shall be made to sufficient depth to reach sound foundation material, adequate to provide a suitable seepage barrier, as determined by the Engineer. All loose, soft or disintegrated material shall be removed from pockets and depressions to the extent directed.

Measurement and Payment. Measurement for payment for excavation, unclassified, for dam works will be made of the materials in excavation only to the lines, grades, and dimensions shown on the Drawings or established by the Engineer.

Payment for excavation, unclassified, for dam works will be made at the unit price per cubic yard bid in the Schedule for Item 4, Excavation, Unclassified, for Alternate Site Empoundment Area Dam.

The amount bid shall be full payment for completion of the work specified herein and elsewhere in these Specifications and on the Drawings for Item 4, Excavation, Unclassified, for Alternate Site Empoundment Area Dam and shall include all of the Contractor's costs of whatsoever nature, including excavating and transporting materials to points of final use; rehandling of suitable dam embankment materials, if required; and disposal of unsuitable materials.

EXCAVATION, UNCLASSIFIED, FOR
ABUTMENT CUTOFFS

Scope of Work. The work to be done under Excavation Unclassified, for abutment cutoffs, Item 6, consists of performing all excavation for the abutment cutoffs, and cutoff trenches except excavation included under Item 2, Excavation, Unclassified, Stripping Foundations, in accordance with Drawing #5 of 16 and these Specifications. The work to be done by the Contractor includes excavation for abutments and the cutoff trench; transporting the excavated material to embankments or to temporary stockpiles, from temporary stockpiles to points of final use, and to designated disposal areas; rehandling of material which cannot be placed in the embankments directly from the excavation; and placing materials not suitable or required for the permanent works in designated disposal areas.

General. Except as otherwise provided herein, all excavation, unclassified, for abutment cutoffs shall be made to the alignments, grades and dimensions shown on the Drawings or established by the Engineer and shall be in complete conformity with the applicable requirements set forth in the section, Excavation and Earthwork, General.

It is anticipated that nearly all materials below the lines of stripping excavation are suitable materials for use in the embankments. All suitable embankment materials shall be placed in the designated final locations of the embankments directly from the excavation, or shall be placed in temporary stockpiles and later placed in the designated locations as directed by the Engineer. In excavating materials which are suitable for use in the embankments, the Engineer will designate the depths of cut which will result in the best gradation of materials, and the cuts shall be made to such designated depths. Excavated materials which are unsuitable for or are in excess of the embankments or other earthwork requirements, as determined by the Engineer, shall be placed in designated disposal areas.

Excavation for the cutoff trench shall be made to sufficient depth to reach sound foundation material, adequate to provide a suitable seepage barrier, as determined by the Engineer. All loose, soft or disintegrated material shall be removed from pockets and depressions to the extent directed. The assumed lines shown on the Drawings shall not be interpreted as indicating with any degree of accuracy the final or actual depths of the required excavation.

Measurement and Payment. Measurement for payment for excavation, unclassified, for abutment cutoffs will be made of the material in excavation only to the lines, grades, and dimensions shown on the Drawings or established by the Engineer.

Payment for excavation, unclassified, for abutment cutoffs will be made at the unit price per cubic yard bid in the Schedule for Item 5, Excavation, Unclassified, for Abutment Cutoffs.

The amount bid shall be full payment for completion of the work specified herein and elsewhere in these Specifications and on the Drawings for Item 6, Excavation, Unclassified, for abutment cutoffs, and shall include all of the Contractor's costs of whatsoever nature, including excavating and transporting materials to points of final use; rehandling of suitable embankment materials, if required; and disposal of unsuitable materials.

EXCAVATION IN BORROW AREAS
AND TRANSPORTATION TO EMBANKMENTS

Scope of Work. The work to be done under Item 6 consists of performing excavation in Borrow Areas to provide suitable materials to construct the embankments for Alternate Site Empoundment Area Dam in accordance with the Drawings and these Specifications. Excavation to be performed under Item 6 shall be below the stripping excavation, if required, specified under Item 3, Excavation, Unclassified, Stripping Borrow Areas. The work to be done by the Contractor includes excavation below the stripping excavation; transportation of excavated materials to the embankments; all work to maintain the borrow areas in good working order; all work to obtain the proper embankment materials for each zone of the embankments; and other related work.

General. Except as otherwise provided herein, all excavation in borrow areas shall be made to the alignments, grades and dimensions established by the Engineer and shall be in complete conformity with the applicable requirements set forth in the section, Excavation and Earthwork, General.

The quantities shown in the Schedule indicate the amount of each type of embankment material that is anticipated will be taken from the borrow areas to construct the embankments. It is possible that more material from required excavation under these Specifications will be used in embankment than anticipated and that more or less material, suitable for embankments, will be found in each borrow area than anticipated. It is therefore possible that the actual quantities of materials required to be excavated from any borrow area may differ from that shown in the Schedule; however, no additional allowance above the unit price per cubic yard bid in the Schedule will be made by reason of the amount of excavation in any borrow area actually required.

Excavation. All materials for the Alternate Site Empoundment Area Dam embankment, which are not available from required excavation under Item 4, Excavation, Unclassified, for Alternate Site Empoundment Area Dam and Item 5, Excavation, Unclassified, for Abutment Cutoffs, shall be taken from borrow pits within the limits of Borrow Areas designated on the Drawings. All materials required for the Abutment Cutoff embankment which are not available from required excavation under Item 5, Excavation, Unclassified for Abutment Cutoffs, shall be taken from borrow pits as designated on the Drawings. The location and extent of all borrow pits within the borrow areas and the depths of cut shall be as directed by the Engineer. In general, borrow pits within any borrow areas will be located to permit the shortest haul routes possible to the points of final use. The location of the borrow pits shall be such as to obtain suitable materials with the least amount of stripping excavation.

The Contractor's operations in the excavation of materials in borrow pits shall be such as will result in an acceptable gradation of the materials when compacted in the fill. The materials shall be excavated by equipment in such a manner that an approximate uniform cutting from the full height of the face, over the designated depth of cut, is obtained to provide acceptable gradation of the material when compacted in the fill. Any material excavated from any borrow pit that is unsuitable for use in the embankment because of careless excavation or use of improper equipment in excavation will be rejected by the Engineer and no payment will be made for such wasted material.

The types of material in the borrow areas are indicated by the gradation curves and the logs of auger holes and test pits shown in the Soils and Geologic Report. The Owner does not guarantee the correctness of these curves and logs nor any interpretations, deductions or conclusions indicated relative to the nature of materials to be encountered, and this data is shown for the convenience of the Contractor only.

Excavated slopes of borrow pits shall be graded to slopes not steeper than 2 to 1. All borrow pits, including surfaces of wasted material, shall be left in a reasonably smooth and even condition. To avoid the formation of pools in borrow pits, drainage ditches from borrow pits to the nearest outlet shall be excavated by the Contractor where, in the opinion of the Engineer, such drainage ditches are necessary.

If materials unsuitable for or not required for permanent construction purposes are found in any borrow pit, such materials shall be left in place, or if so directed by the Engineer, shall be excavated and wasted as directed.

Irrigation. If required to obtain the specified compaction, moisture shall be introduced into the borrow areas by irrigation or other suitable methods. If moisture is introduced into the borrow areas prior to excavation care shall be taken to moisten the material uniformly. Supplemental water, if required, shall be added to the materials by sprinkling on the embankments.

Excessive Moisture. If at any location in the borrow pits for earthfill materials, before or during excavation operations, there is excessive moisture, as determined by the Engineer, steps shall be taken to reduce the moisture by selective excavation to secure the drier materials, by excavating and placing in temporary stockpiles materials containing excessive moisture, by excavating drainage ditches, by allowing adequate additional time for curing or drying, or by any other approved means.

Measurement and Payment. Measurement for payment for excavation in borrow areas and transportation to embankments will be made of the material in excavation only and will only be made of materials excavated at the direction of the Engineer and transported to the embankments for use in the embankments or to waste disposal areas.

Payment for excavation in Borrow Areas and transportation to the Alternate Site Empoundment Area Dam embankment will be made at the unit price per cubic yard bid in the Schedule for Item 6, Excavation, Unclassified, in Borrow Area and Transportation to Alternate Site Empoundment Area Dam Embankment.

The amounts bid shall be full payment for completion of the work specified herein and elsewhere in these Specifications and on the Drawings for Item 6, and shall include all of the Contractor's costs of whatsoever nature, including the cost of excavating; transporting suitable embankment material to the embankments and unsuitable embankment material to disposal areas; maintaining the borrow areas in good working order; performing irrigation operations to provide material at the proper moisture content for use in embankments; and the cost of delays of poor trafficability due to the irrigation operations necessary to properly condition the embankment material.

PLACING EMBANKMENT WITH CORE

Scope of Work. The work to be done under Item 7 consists of placing and compacting all material required to construct the embankment for Alternate Site Empoundment Area Dam to the lines, grades and dimensions shown on the Drawings or established by the Engineer in Accordance with the Drawings and these Specifications.

The work to be done by the Contractor includes placing of embankment material, compacting embankment material, and performing all work to ensure proper bond of the embankment material with the foundation and previously placed embankments.

General. Except as otherwise provided herein, the embankments shall be placed to the alignments, grades and dimensions shown on the Drawings or established by the Engineer and shall be in complete conformity with the applicable requirements set forth in the section, Excavation and Earthwork, General.

The proposed embankment is not zoned except from the standpoint of material preparation and moisture control described hereinafter and shall consist of random fill as approved, by the Engineer, from one or a combination of Borrow Areas, Excavation from Cutoff Trenches, or other unclassified excavation. No brush, root, sod or other perishable or unsuitable materials, as determined by the Engineer, shall be placed in the embankment. The suitability of each part of the foundation for placing embankment materials thereon will be determined by the Engineer.

The embankment shall be constructed of suitable materials in accordance with the Drawings and as herein specified and all materials shall be placed in approximately horizontal layers of the specified thickness. The embankment shall be placed in approximately horizontal lifts extending from abutment to abutment; except where specific approval by the Engineer is given, the lifts may be discontinued prior to reaching the abutment providing the slopes of the bonding surfaces between adjoining portions of the embankment shall be not steeper than 10 to 1. Previously placed material shall be moistened, scarified, and worked with harrow or other suitable equipment in such a manner and to such depths as will ensure a satisfactory bonding surface with the new material.

The Contractor shall maintain the embankments in a manner satisfactory to the Engineer until the final completion and acceptance of all the work under the Contract. Each load of the material placed in the embankments, whether from required excavation for other parts of the work or from borrow areas, shall be placed in the location designated by the Engineer, regardless of the classification of the excavation, and the Contractor shall be entitled to no additional allowance above the unit prices bid in the Schedule for excavation and embankment on account of this requirement.

All portions of the embankments whether constructed of materials from required excavations for other parts of the work, or from borrow areas, will be measured and paid for in embankment after being compacted. Payment for placing and compacting will be in addition to the payment made for excavation and transportation to points of final use, which excavation price shall include the cost of stockpiling and rehandling, if required, of all such materials.

It may be feasible to transport a portion of the materials from required excavations for other parts of the work, and which are suitable for embankment construction, directly to the embankment at the time of making the excavations, but the Contractor shall be entitled to no additional compensation above the unit prices bid in the Schedule for excavation or embankment by reason of its being necessary or required by the Engineer that such excavated materials be deposited in temporary storage piles prior to being placed in the embankment.

Foundation Preparation. No material shall be placed in any section of the embankments until the foundation for that section has been cleared, stripped, unwatered, and prepared in accordance with the provisions of these Specifications. The foundation shall be plowed thoroughly to a depth of 6 inches, where required, as directed by the Engineer and shall then be leveled and compacted so that the surface materials of the foundation will be as compact and well-bonded with the first layer of fill as herein specified for subsequent layers of fill. To minimize weathering of foundation surfaces, final preparation of surfaces which may weather, as determined by the Engineer, shall be performed immediately prior to placing fill thereon. The surface of each portion of the foundation shall have all water removed from depressions and shall be properly moistened to obtain a suitable bond with the fill.

Materials. In general, each load of material shall be placed in the embankment according to the source of excavation; however, the Owner reserves the right to place each load of material in any location designated by the Engineer regardless of the source of the material.

It should be noted that the central portion of the Embankment fill shall be placed as a plastic core. The core material shall consist of moist clay material placed in equal horizontal lifts and simultaneous with the remaining embankment material.

The required segregation or mixing of materials shall be obtained by the methods of excavation used in obtaining the materials and no screening or separation of materials, except by selective excavation, will be required. Any rocks larger than 6 inches in maximum size that are encountered in otherwise approved embankment material shall be removed and placed on the outer slopes of the embankment.

Moisture Control. The moisture content of the embankment material prior to and during compaction shall be distributed uniformly throughout each layer of the material. In general, it will be required that the average placement moisture content of impervious materials be maintained within 2% above or below the standard optimum condition. The exception

being the moist core which shall be placed and controlled at $OMC + 5\% \pm 2\%$. Standard optimum moisture content is defined as the moisture content which will result in the maximum dry unit weight of the materials when subjected to the Standard Proctor Compaction Test. In general, it will be required that pervious materials shall be thoroughly wetted just prior to compaction but shall not contain moisture to the extent which will interfere with the Contractor's hauling, placing or compacting equipment.

Supplementary water, if required, shall be added to the material by sprinkling on the embankments and shall be mixed uniformly throughout the layer and portion thereof. Excavated materials which the Contractor desires to use for embankments and which are otherwise suitable for the embankments except that when excavated are too wet for immediate compaction, shall be placed temporarily in stockpiles until the moisture content is such as to permit them to be placed in the embankment to include the core.

Placing. The distribution and gradation of the materials throughout the embankment shall be as shown on the Drawings or as directed by the Engineer and shall be such that the embankment will be free from lenses, pockets, streaks, and layers of material differing substantially in texture or gradation from the surrounding material within each particular zone of the dam embankment. The combined excavation and placing operations shall be such that the materials when compacted in the embankment will be blended sufficiently to secure the best practicable degree of compaction and stability. Successive loads of material shall be dumped on the embankment so as to produce the best practicable distribution of the material, subject to the approval of the Engineer, and for this purpose the Engineer may designate the locations in the embankment where the individual loads shall be deposited. All material shall be placed and compacted in the embankment in continuous, approximately horizontal layers of the thickness specified. If, in the opinion of the Engineer, the compacted surface of any layer of fill is too wet for proper compaction of the layer of material to be placed thereon, it shall be allowed to dry; or worked with harrow, scarifier, or other suitable equipment and then compacted to provide a satisfactory bonding surface before the next succeeding layer of fill material is placed.

Compacting. When each layer of material has been conditioned to have the required moisture, it shall be compacted in layers not exceeding 6 inches in thickness after compaction by rolling with sheep-foot or other approved equal tamping rollers of adequate weight and size until the dry density of the compacted material is not less than 95 percent of the laboratory maximum dry density for the materials being compacted, as determined by the Standard Proctor Compaction Test, ASTM Designation: D698, Method A. The exception being the moist core material which shall be compacted to a maximum of percent of Standard Proctor Compaction test, ASTM Designation D698, Method A.

For those portions of the embankment where it is not possible to obtain adequate compaction with rolling equipment, the embankment shall be compacted by mechanical tampers of adequate weight and design so as to obtain the same degree of compaction specified for the balance of the embankment. Depth of compacted layers and moisture content of material placed in each zone shall be as specified above and particular care shall be taken to ensure adequate bonding of material with the abutments, compacted backfill and with adjacent rolled embankments. The Contractor shall be responsible for any damage to structures caused by its operations in placing embankment material adjoining structures and any damage to structures shall be repaired by and at the expense of the Contractor. No additional payment because of the requirement of special compaction at the abutments will be made and the cost of such work shall be included in the applicable unit prices bid in the Schedule.

The Engineer will take samples from the embankment and will perform the tests required to determine that the compaction is meeting the requirements of these Specifications. The Contractor shall aid the Engineer in obtaining representative samples for testing.

Measurement and Payment. Measurement for payment for placing the dam embankment will be made of the material compacted in place in the completed embankment of the lines, grades, and dimensions as shown on the Drawings or established by the Engineer as the work progresses. Measurement for payment for material placed upon or against surfaces of foundation will be made to the same lines for which payment for excavation is made.

The amounts bid shall be full payment for completion of the work specified herein and elsewhere in these Specifications and on the Drawings for Item 7, and shall include all of the Contractor's costs of whatsoever nature; including the entire cost of preparing all foundations for embankments, of all operations required to meet moisture control requirements, of placing and working the materials, of all work required to obtain the degree of compaction herein specified, of all work required to specially compact embankment at abutments and adjoining concrete structures, and of all other work required to construct the embankments in accordance with these Specifications.

FILTER BLANKET UNDER EMBANKMENT

Scope of Work. The work to be done under Filter Blanket Under Embankment, Item 8, consists of furnishing and placing filter blanket under proposed downstream embankment construction in accordance with the Drawings and these Specifications. The work to be done by the Contractor includes excavating filter blanket material, disposing of waste material, transporting filter blanket to points of use, and placing filter blanket at the locations shown on the drawing and as required by the Engineer.

Filter blanket under proposed riprap shall be placed on the downstream face of the Alternate Site Empoundment Area Dam, and elsewhere if designated by the Engineer.

The material used for filter blanket and the manner of excavating and placing filter blanket shall be subject to approval.

Requirement. Filter blanket shall consist of pit-run materials obtained from approved sources and shall be placed to the thickness, lines and grades shown on the Drawings or established by the Engineer. Approval of the source shall be construed as constituting approval of all materials taken from the source. The Contractor will not be required to wash, screen, or otherwise process the base course material from other sources approved by the Engineer provided the materials shall be reasonably well graded and, when tested by means of standard screens conforming to A.S.T.M. designation E-11, shall conform to the following limits:

<u>Sieve No. or Size</u>	<u>Percent Passing by Weight</u>
3" square openings	100
No. 4	75 - 95
No. 40	40 - 65
No. 100	25 - 45
No. 200	0 - 5

Other materials, including sand, may be submitted for consideration and approval for the filter blanket.

Measurement and Payment. Measurement for payment of filter blanket will be made of the filter blanket placed to the lines, grades, dimensions and thicknesses shown on the Drawings or established by the Engineer.

Payment for Filter Blanket will be made at the unit price per cubic yard bid in the Schedule for Item 8, Placing Filter Blanket in Alternate Site Empoundment Area Dam.

The amount bid shall be full payment for completion of the work specified herein and elsewhere in these Specifications and on the Drawings for Item 8, Placing Filter Blanket in Alternate Site Empoundment Area Dam, and shall include all of the Contractor's costs of whatsoever nature, including all costs and producing, handling, transporting and placing filter blanket.

BASE COURSE UNDER RIPRAP

Scope of Work. The work to be done under Base Course Under Riprap, Item 9, consists of furnishing and placing base course under riprap in accordance with the Drawings and these Specifications. The work to be done by the Contractor includes excavating base course material; disposing of waste material; transporting base course to points of use; and placing base course at the locations shown on the Drawings and as required by the Engineer.

Base course under riprap shall be placed on the upstream face of Alternate Site Empoundment Area Dam as designated by the Engineer.

The material used for base course and the manner of excavating and placing base course shall be subject to approval.

Requirement. Base course shall consist of pit-run materials obtained from approved sources, and shall be placed to the thickness, lines and grades shown on the Drawings or established by the Engineer. Approval of a source shall not be construed as constituting approval of all base course taken from the source. The Contractor will not be required to wash, screen, or otherwise process the base course material from other sources approved by the Engineer provided the material shall be reasonably well graded and, when tested by means of standard screens conforming to ASTM Designation: E11, shall conform to the following limits:

<u>Sieve No. or Size</u>	<u>Percent Passing by Weight</u>
3" square openings	100
3/4" square openings	70 - 90
No. 4	40 - 70
No. 16	20 - 50
No. 40	10 - 30
No. 100	5 - 20
No. 200	0 - 10

Measurement and Payment. Measurement for payment of base course under riprap will be made of the base course placed to the lines, grades, dimensions and thicknesses shown on the Drawings or established by the Engineer, and within the lines to which payment for excavation is made.

Payment for base course under riprap will be made at the unit price per cubic yard bid in the Schedule for Item 9, Base Course Under Riprap.

The amount bid shall be full payment for completion of the work specified herein and elsewhere in these Specifications and on the Drawings for Item 9, Base Course Under Riprap, and shall include all of the Contractor's costs of whatsoever nature, including all costs in producing, handling, transporting and placing base course.

RIPRAP

Scope of Work. The work to be done under Item 10, Riprap, consists of loading, transporting and placing riprap of the specified size and thickness at the locations shown on the Drawings or designated by the Engineer in accordance with the Drawings and these Specifications. Riprap shall be placed on the upstream face of Alternate Site Empoundment Area Dam and elsewhere as designated by the Engineer.

Requirements. Riprap shall be placed to the thicknesses, lines, and grades shown on the Drawings or established by the Engineer. The riprap shall be obtained from approved stockpiles established by the Contractor or from unsuitable material unearthed in Borrow Sites or Unclassified Excavation.

Materials. Riprap materials shall consist of sound, dense and durable boulders and rock fragments. Riprap materials will not be available at the project location in sufficient quantities to meet the requirements of Riprap, Item 10. The riprap will be gathered and stockpiled in separate stockpiles by the Contractor at nearby locations:

- a. Type A materials meeting the requirements of riprap having a specified thickness of 24 inches to 36 inches consisting of graded materials ranging from 1/4 cubic foot to 9 cubic feet which shall be placed on the upper portion of the upstream face.

Placing Riprap. The riprap need not be hand placed and shall be dumped and leveled in order to ensure that it is stable without tendency to slide and so there will be no large unfilled spaces within the riprap.

Care shall be taken when placing riprap adjoining concrete structures to avoid damage to structures, and any damages caused by the Contractor's operations in placing riprap shall be repaired by and at the expense of the Contractor.

Measurement and Payment. Measurement for payment of riprap will be made on the basis of the thicknesses shown on the Drawings or established by the Engineer and within the lines to which payment for excavation is made.

Payment for riprap will be made at the unit price per cubic yard bid in the Schedule for Item 10, Riprap Type A.

The amount bid shall be full payment for completion of the work specified herein and elsewhere in these Specifications and on the Drawings for Item 10, Riprap, and shall include all of the Contractor's costs of whatsoever nature including the cost of loading and transporting riprap obtained from Owner's stockpiles to points of final use, and placing the riprap obtained from Owner's stockpiles and from required excavation.

COMPACTED BACKFILL

Scope of Work. The work to be done under Compacted Backfill, Item 11, consists of placing and compacting backfill in accordance with the Drawings and these Specifications. The work to be done by the Contractor includes placing and compacting backfill about any structures or locations shown on the Drawings; and at any other locations specified by the Engineer.

General. Backfill shall be placed and compacted about structures as stipulated herein to the lines and grades shown on the Drawings or directed by the Engineer, and shall be in complete conformity with the applicable requirements set forth in the section, Excavation and Earthwork, General.

The backfill material shall be placed in layers, conditioned, and compacted in accordance with the applicable provisions of the section, Excavation and Earthwork, General.

Special care shall be taken in compacting backfill materials adjoining concrete structures. Compaction by heavy equipment will not be permissible within a reasonable distance of concrete structures, as determined by the Engineer, and shall be performed by approved special rollers or mechanical tampers. The Contractor shall be responsible for any damage to structures caused by its operations in placing and compacting backfill adjoining structures and any damage to structures shall be repaired by and at the expense of the Contractor.

Measurement and Payment. Measurement for payment for compacted backfill will be made of the material placed and compacted to the lines, grades and dimensions shown on the Drawings or established by the Engineer and within the lines to which payment for excavation is made.

Payment for compacted backfill will be made at the unit price per cubic yard bid in the Schedule for Item 11, Compacted Backfill.

The amount bid shall be full payment for completion of the work specified herein and elsewhere in these Specifications and on the Drawings for Item 11, Compacted Backfill, and shall include all of the Contractor's costs of whatsoever nature, including the entire cost of all operations to meet moisture control requirements; of placing and working the materials; of work to obtain the degree of compaction specified; and of the work to place and compact material adjoining concrete structures.

The payment for placing and compacting backfill shall be in addition to the payment for excavation and transportation of the material to points of use, which excavation prices shall include the cost of stockpiling and rehandling of all backfill materials.

PIEZOMETER

Scope of Work. The work to be done under Piezometer, Item 12, consists of furnishing and installing ground water monitoring piezometers along the embankment at Alternate Site Empoundment Area Dam at the location shown on the Drawings and in accordance with these Specifications or as directed by the Engineer.

General. Piezometers shall conform to the information presented in the detail section of the Drawings.

Measurement and Payment. Measurement for payment for furnishing and constructing piezometer tubes will be made for the total number of piezometers established.

Payment for constructing piezometers will be made at the unit price per each bid in the Schedule for Item 12, Piezometer.

The amount bid shall be full payment for completion of the work specified herein and elsewhere in these Specifications and on the Drawings for Item 12, Piezometers, and shall include all of the Contractor's costs of whatsoever nature.

MOVEMENT MONUMENT

Scope of Work. The work to be done under Movement Monuments, Item 13, consists of furnishing and installing various movement monuments along the crest of Alternate Site Empoundment Area Dam as shown on the Drawings and in accordance with these Specifications or as directed by the Engineer.

General. Materials and locations of the proposed movement monuments shall conform to the dimensions and locations as noted on the Drawings, and shall be done by a Land Surveyor, licensed to practice in the State of Utah.

Measurement and Payment. Measurement for payment for furnishing and installing movement monuments will be made for the total number of movement monuments placed.

Payment for movement monuments will be made at the unit price per each bid in the Schedule for Item 13, Movement Monuments.

The amount bid shall be full payment for completion of the work specified herein and elsewhere in these Specifications and on the Drawings for Item 13, Movement Monuments, and shall include all the Contractor's costs of whatsoever nature.

DRAIN PIPE

Scope of Work. The work to be done under Drain Pipe, 6-inch Diameter, Item 14 consists of furnishing and installing perforated concrete drain pipe along the embankment expansion at Alternate Site Empoundment Area Dam as shown on the Drawings and in accordance with these Specifications or as directed by the Engineer.

General. Perforated concrete drain pipe shall conform to the requirements of ASTM Designation: C444, Type 2, and all applicable requirements of ASTM Designation: C 14, for Concrete Sewer, Storm Drain and Culvert Pipe, Table 2. The pipe shall meet the physical and dimensional requirements for extra strength nonreinforced concrete pipe.

Laying. Perforated concrete drain pipe shall be laid at the locations and to the lines and grades shown on the Drawings or directed by the Engineer. The pipe shall be laid with open joints in pervious embankment materials smoothed and graded to provide a firm bedding for the pipe. The bell end of the pipe shall be laid upgrade with joint openings not less than 1/4 inch nor more than 3/8 inch and spigot end concentrically in the bell. The pervious material shall then be carefully placed at the sides and over the top of the pipe and tamped about the pipe so as not to disturb the pipe after being laid and to hold it securely in position while the overlying material is being placed.

Measurement and Payment. Measurement for payment for furnishing and laying perforated concrete drain pipe with open joints will be made along the centerlines of the pipe from end to end of the pipe in place, and no allowances will be made for lap at joints.

Payment for furnishing 6-inch Diameter perforated concrete drain pipe with open joints will be made at the unit price per linear foot bid in the Schedule for Item 14, Drain Pipe, 6-inch Diameter.

The amount bid shall be full payment for completion of the work specified herein and elsewhere in these Specifications and on the Drawings for Item 14, Drain Pipe, 6-inch Diameter, and shall include all of the Contractor's costs of whatsoever nature. Payment for providing and placing filter blanket bedding materials around the drain pipe shall be considered as incidental to the unit price per cubic yard bid for Item 8, Filter Blanket, and no additional compensation will be allowed.

PRESSURE RELIEF WELL

Scope of Work. The work to be done under Pressure Relief Well, 6 inch effective diameter, Item 15 consist of furnishing and installing pressure relief wells along the downstream toe at the Alternate Site Impoundment Area Dam as shown on the drawing, and in accordance with these specifications or as directed by the Engineer.

General. The wells shall extend into the pervious foundation layer below the Cutoff Trench and be of a length equal to the height of the dam. The well will consist of a screen section, riser pipe, gravel filter to an elevation of 10 feet below the finished ground surface. The screen and riser are a 8 inch wood pipe. The screen is perforated with slots 3/16 inch wide and 3½ inch long and the bottom of the well screen is closed with a wood plug. The top of the well must be protected with a metal guard.

Placing. The pressure relief well is placed by sinking a casing of appropriate size to the depth and washing out the soil inside the casing. The assembled well pipe, consisting of the screen and riser, is lowered into the casing and properly alined. The filter material is then placed in 6 to 8 inch layers while the casing is withdrawn an equal height. Repeat until the filter material is several feet above the top of the screen section. Impervious backfill and concrete is filled for the remaining height along the outside of the pipe. After installation the well must be thoroughly cleaned out or pumped of surged to remove any fine soil immediatly adjacent thereto.

Measurement and Payment. Measurement for payment for furnishing and installing pressure relief wells will be made for the total number of pressure relief wells installed.

Payment for pressure relief wells will be made at the unit price per each pressure relief well bid in the schedule for Item 15, Pressure Relief Wells.

The amount bid shall be full payment for completion of the work specified herein and elsewhere in these specifications and on the drawings for Item 15, Pressure Relief Wells, and shall include all the Contractor's cost of whatsoever nature.

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Mine Permit Number MOI 70001 Mine Name Tickaboo Stockpile
Operator UCOLO Expl Corp Date 9-3-1980
TO _____ FROM _____

☐ CONFIDENTIAL ☐ BOND CLOSURE ☐ LARGE MAPS ☒ EXPANDABLE
☐ MULTIPUL DOCUMENT TRACKING SHEET ☐ NEW APPROVED NOI
☐ AMENDMENT ☐ OTHER _____

Description

YEAR-Record Number

☐ NOI ☒ Incoming ☐ Outgoing ☐ Internal ☐ Superceded

Specifications for Alternate Site
Impoundment Area - Earth Dam
Appurtenant Construction

☐ NOI ☐ Incoming ☐ Outgoing ☐ Internal ☐ Superceded

☐ NOI ☐ Incoming ☐ Outgoing ☐ Internal ☐ Superceded

☐ NOI ☐ Incoming ☐ Outgoing ☐ Internal ☐ Superceded

☐ TEXT/ 8 1/2 X 11 MAP PAGES ☐ 11 X 17 MAPS ☐ LARGE MAP

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